Coal Age

HOW MANY MEN CAN YOU BOSS? ..p 70

The Leatherwood Mine Story • Coating Roof With Paint
Anthracite Safety Teamwork • Underground Power Supply
Trees for Strippings • Planned Maintenance • Annual Index

CUT A MILE OFF YOUR HAULING TIME!

It's true! A.C.F. Drop Bottom Mine Cars save *at least* as much time as your trips now use to cover the last mile of hauling.

In many mines, the time savings add up high enough to let each trip of cars make an extra round trip a day—a *big* production bonus!

Here's how it's done. Instead of spending the usual 5, 10 or even 15 minutes unloading, a trip of fifteen A.C.F. Drop Bottom Mine Cars is empty, ready to return for more coal, in *75 seconds flat!*

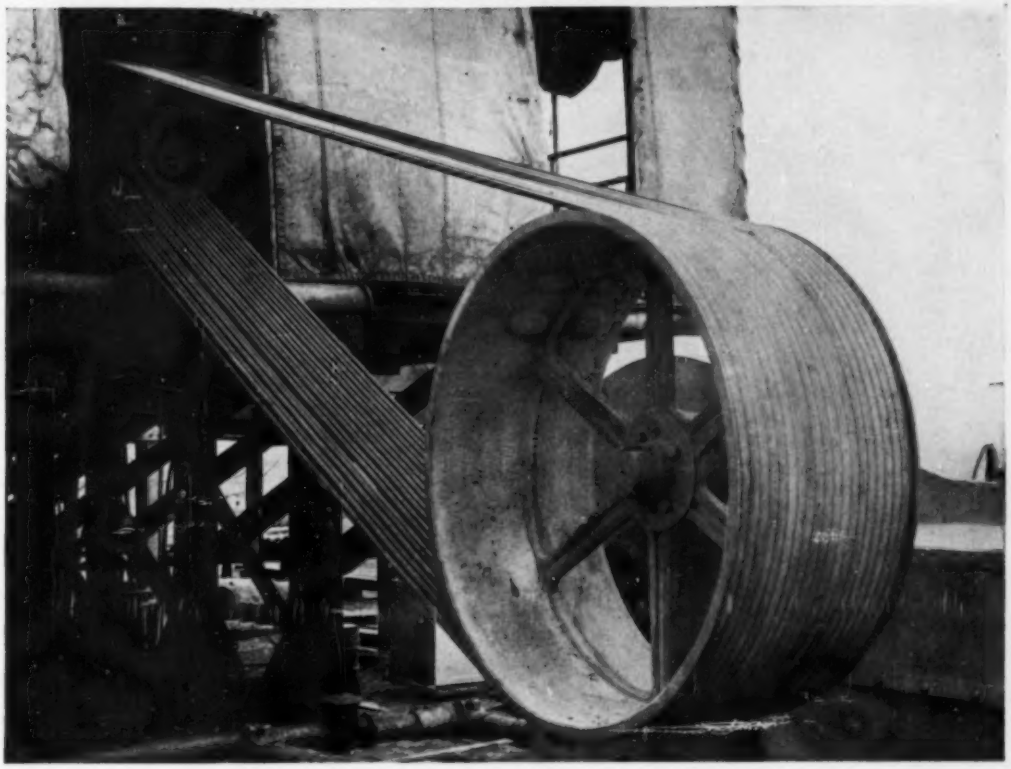
Faster than you can tell about it, each car trips, empties, and latches—*automatically, on the move.* In many mines, the time-savings permit *an extra load of coal for every trip of cars—on every shift!*

Your nearby A.C.F. Representative can give you facts and figures that show just how much time you can save—how much extra tonnage you can produce—with A.C.F. Drop Bottom Mine Cars. American Car and Foundry Company, New York • Chicago • St. Louis • Cleveland • Philadelphia • Washington • Huntington, W. Va. • San Francisco • Berwick, Pa.

a.c.f. **MINE CARS**

for Constant Haulage

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Here B. F. Goodrich grommet belts are saving $104.50 a month

B. F. Goodrich grommet V belts cut costs 20 to 50%

THESE 18 V belts are needed to drive heavy pumps for drilling oil wells. The belts have to operate 24 hours a day, 7 days a week, in all sorts of weather. Ordinary belts couldn't stand the heavy pulling load, couldn't take the strain of round-the-clock operation. They averaged 9 months' life in this kind of service.

Then B. F. Goodrich grommet belts were tried. After 19 months, and drilling wells totaling 76,000 feet deep, these grommet belts look as good today as the day they were installed. Here's why B. F. Goodrich grommet belts can be counted on to save on belt costs:

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet!—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B. F. Goodrich distributor. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Grommet V Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

You wouldn't hitch an

HULBURT OIL & GREASE COMPANY
PHILADELPHIA, PA.
Specialists in Coal Mine Lubrication

Elephant to a racing buggy

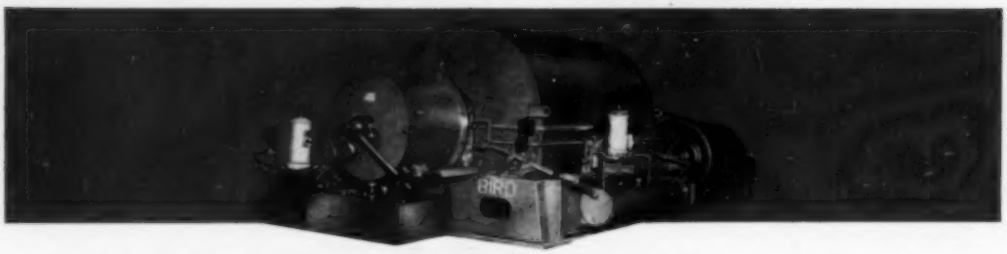
And when it comes to Coal Mine Lubrication

DO THE RIGHT THING

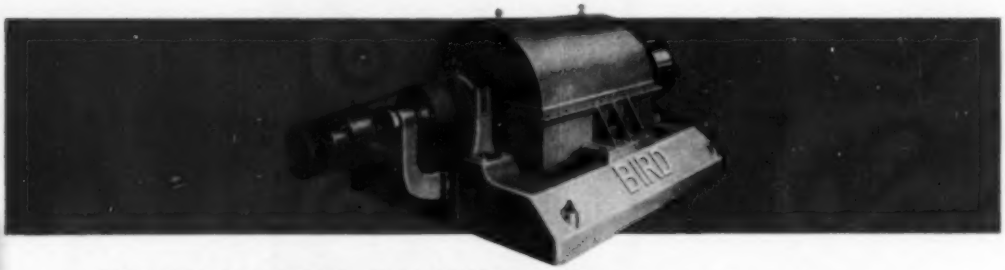
USE

Hulburt Quality GREASE

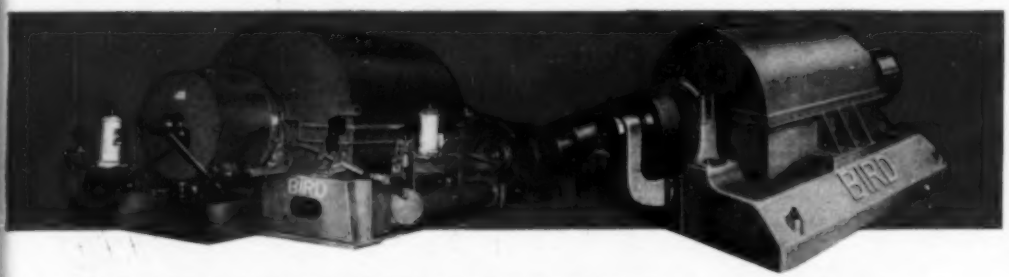
Not even if you had a whole herd! Doing things the right way with the right tools is the sensible way. There's one right way to lubricate coal mining machinery—and that is with Hulburt Quality Grease. It's the right way because Hulburt Quality Grease is a specialized "one-industry" product. Lubricating coal mining machinery is Hulburt's ENTIRE job, gets complete attention and so makes a success of it. Hulburt stands ready to show you the RIGHT way to solve your lubrication problems with the RIGHT lubricant. Right?



THIS BIRD COAL FILTER does a better job of getting the water out of washed fine coal.



AND THIS BIRD POLISHER helps to get the water clean — so clean that all of it can be used over and over — none of it needs to leave the system.



AT LOWEST DEWATERING COST. These BIRDS operate for a few cents per ton. Cost of maintenance is extremely small.

If fine coal drying and clean-up by elevation are of any interest to you, get the facts on the BIRD.

BIRD MACHINE COMPANY

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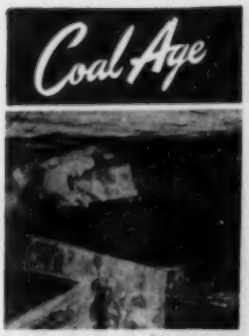

THIS MONTH'S COVER

NEW - TYPE CABLE - REEL SHUTTLE CARS are part of the team getting high output per man at the new Lida B slope mine of the Franklin County Coal Corp. (described in detail in September *Coal Age*). For greater efficiency, the cars match capacity of the 7½-ton mine cars hauling to the slope bottom and have 4-wheel drive and steer. Pushbuttons and lights permit operators to signal the locomotive for car-spotting.

COMING IN JANUARY

Growth Opportunities for Coal—A look at what's ahead for coal demand, from new industries, growth industries and new uses for coal.

Lubricating Georgetown Plant—How the largest centralized lubrication system in coal mining was designed and installed, how it works and what it proves.

Rubber-tired crushing and truck-loading plants operating in the pits are but one of the interesting features of the Marshall Mining Co.'s strippings near Youngstown, Ohio.

Reducing Dust and Fumes in Face Shooting—A USBM authority reports on how fog guns and multiple shooting are setting new marks in dust and fume control underground.

How the A. B.. Meco-Moore Cutter-Loader Works—Design, operation and performance of this British-made continuous unit, scheduled for an early introduction in a U. S. coal mine.

COAL AGE DECEMBER, 1951
VOLUME 56 NUMBER 12
(with which are combined The Colliery Engineer and Mines and Minerals)

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Use hydraulic systems free of rust, sludge and foam. Use TEXACO REGAL OIL (R&O)

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

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● Best way to keep cutters, loaders and other hydraulically controlled equipment on the job is to use *Texaco Regal Oil (R&O)* as the hydraulic medium.

Texaco Regal Oil (R&O) won't sludge or foam, won't let rust form. It keeps hydraulic systems clean . . . assuring smoother, more dependable operation and minimizing wear of moving parts. You'll also find that fewer drains and overhauls are necessary. You'll get more work from your machines, have less maintenance expense.

Texaco Regal Oil (R&O) is a highly refined, turbine quality oil with special Texaco additives and processing that make it *more than ten times as resistant to oxidation and sludging* as ordinary turbine-grade oils, and vastly more effective in preventing sludge, rust and foam.

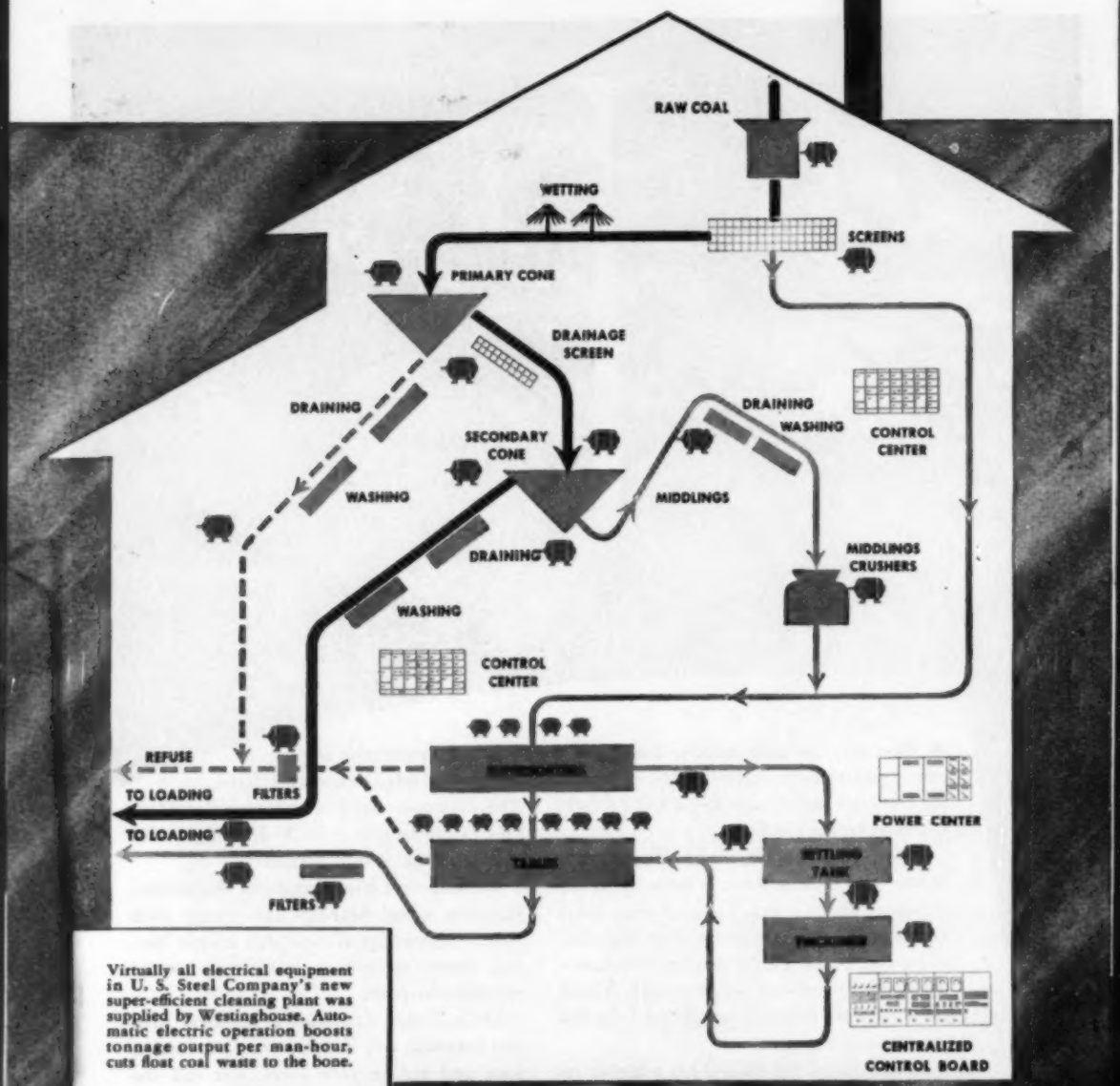
There is a complete line of *Texaco Regal Oils (R&O)* to handle every hydraulic job. No "cutting back" is ever necessary.

To start your mine cars easier this winter, lubricate wheel bearings (all types) with *Texaco Olympian Grease*. It's longer lasting, assures smoother operation and lower maintenance costs.

Let a Texaco Lubrication Engineer help you maintain and increase your production pace and reduce your costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry



Virtually all electrical equipment in U. S. Steel Company's new super-efficient cleaning plant was supplied by Westinghouse. Automatic electric operation boosts tonnage output per man-hour, cuts float coal waste to the bone.

3" to ¼" COAL

MIDDLINGS

REFUSE

YOU CAN BE SURE... OF THE

Westinghouse

EQUIPMENT FOR COAL MINING

How Automatic Operation Cleans 650 Tons of Raw Coal Per Hour

One of the world's largest, U. S. Steel Company's new cleaning plant at Robena, Pennsylvania turns out 650 tons of high-grade metallurgical coal per hour.

The last word in modern, efficient operation, the plant all but runs itself. The U. S. Steel Company and their cleaning plant designers, McNally Pittsburg Manufacturing Corporation, did a top-flight engineering job. And practically all the electrical equipment was supplied by Westinghouse, the electrical manufacturer with widest cleaning plant experience.

Plant Run by 18 Men. The basic secret of this outstanding operation is automatic, centralized control. A few buttons are pressed and the complex related equipment is started automatically, in just the right order. There's no time lost by men following check charts and running all over the plant. This reduces the chance of human error and, most important, it boosts output per man-hour. ***Only 18 men on each shift run the entire operation.***

Smooth Operation, No Pile-ups. Once underway, plant operation is kept safe and smooth by additional electrical controls. If a piece of equipment becomes overloaded, a siren sounds to inform the operator. If the overload persists, coal feed to the unit is automatically stopped to prevent pile-ups. If the unit still remains overloaded it automatically shuts down to prevent damage.

Float Coal Losses Minimized. Another major advantage of automatic electrical control and first-rate equipment engineering is reducing the amount of coal sent to the refuse pile. It can't be eliminated entirely—but losses of float coal are kept to a minimum.

Call Your Westinghouse Office. When you're planning a new plant to turn out better coal and increase sales, make sure you get the best in electrical equipment. It makes a big difference. Call your Westinghouse office early in the planning stage. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-94848

Raw coal feeders are driven by Westinghouse motors and speed reducers. Motor speed is varied by remote control to adjust the rate of coal fed to the plant. All motors in the Robena cleaning plant are the totally-enclosed, fan-cooled type.

Incoming power enters these efficient, spacesaving Westinghouse power centers. Major elements are protective switchgear, ASL dry-type transformers (safest transformer ever built), feeder circuits to local control centers. (See next photo.)

How does he remember which motors to start first? He doesn't have to. Sequence-motor-starting automatically starts complex related equipment in the right order. Individual motor control is also provided for testing and special operations.

Only Carlon ... the first real pipe that is plastic

ONLY CARLON solves the piping problems of surface and subsurface mines. It can be installed rapidly wherever needed, either for emergency service or permanent use, and has a trouble-free life many times that of metallic pipe.

CARLON plastic pipe is guaranteed against rot, rust and electrolytic corrosion. It is unaffected by the chemical action of sulphurous waters, alkalies, metallic salts and other corrosive wastes. Having a smooth internal surface, it will not accumulate scale.

CARLON is light in weight and can be installed easily without materials handling equipment or special tools. Flexible CARLON is produced in all standard pipe sizes and is supplied in long lengths which require fewer fittings. It conforms to irregular surface contours and curving slopes and entries.

A complete line of molded plastic fittings is available for joining lengths of CARLON or for connecting this new pipe to previously installed metallic systems.

NOM. SIZE	O.D.	I.D.	EST. BURST P.S.I.	WT. LBS. PER FT.	SHPG. LENGTHS
½"	0.840	0.622	540	0.103	400 ft. coils
¾"	1.050	0.824	350	0.140	400 ft. coils
1"	1.310	1.070	200	0.181	300 ft. coils
1¼"	1.660	1.380	200	0.267	300 ft. coils
1½"	1.900	1.610	200	0.320	250 ft. coils
2"	2.378	2.070	170	0.445	200 ft. coils
2½"	2.875	2.469	170	0.680	200 ft. coils
3"	3.504	3.070	165	0.910	100 ft. coils
4"	4.504	4.030	130	1.250	25 ft. str.
6"	6.630	6.070	115	2.230	25 ft. str.

Identification Stripe: WHITE—Standard Pipe
RED—Heavy-duty Pipe

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Actual service records show that Simplex-TIREX cords and cables have proved to be the most economical because the Selenium Neoprene Armor lasts so long.

Whenever your requirements call for the use of a portable cord or cable, specify and be sure that you get Simplex-TIREX Cords and Cables.

If it isn't made by Simplex it isn't Tirex

Simplex - WIRES & CABLES

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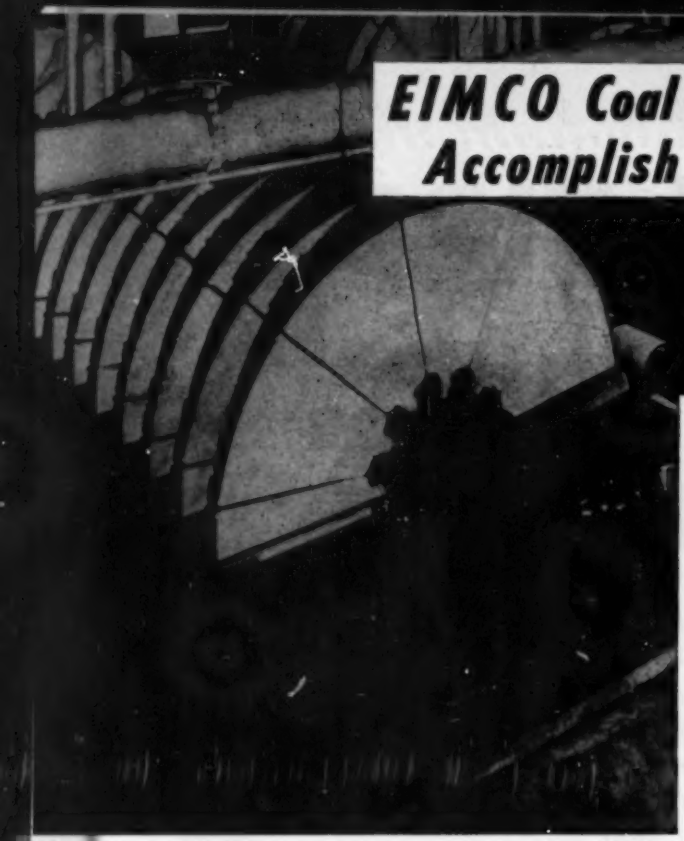
EIMCO Coal Dewatering Filters Accomplish TWO Purposes



The installation of EIMCO fine coal dewatering equipment in modern coal preparation plants has accomplished a two-fold purpose for the user:

1. Fine coals are dewatered and sold. This reclaimed product has been turned into a profit making asset.
2. Water discharged from the EIMCO Filter is clear and free of objectionable matter. This solves the problem of complying with the various State Anti-pollution laws.

Every Eimco is backed by more than half a century of experience and service to the mining industry.

Write for more information on EIMCO fine coal dewatering filters. You can't beat an EIMCO.

View of Eimco's filtration laboratory, operated in conjunction with its New York office.

Eimco's Trained Technologists help customers make a study of their filtration problems and select machines best suited for the operation.

EIMCO

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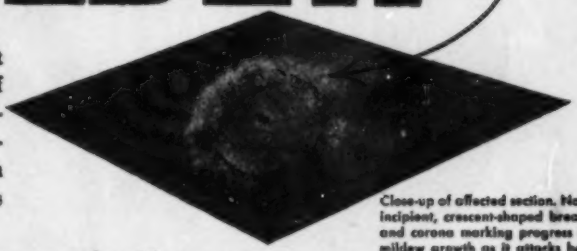
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

A245

Meet your Belt's Worst Enemy

MILDEW

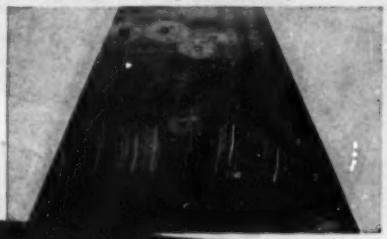
WHEN a conveyor belt fails — won't hold fasteners and becomes full of soft, circular-shaped "mushy" spots — don't blame stone bruises or high tension for the carcass failure. For the truth is — as the G.T.M. *proved* over 20 years ago—the cause is mildew.



Close-up of affected section. Note incipient, crescent-shaped breaks and corona marking progress of mildew growth as it attacks belt carcass.

The Goodyear Technical Man can show you proof positive that this cancerous "rot" of the tension member of a belt is the chief cause of premature belt failure of ordinary conveyor belts. Its growth is promoted by darkness, intermittent belt use, dampness, lack of ventilation and the prevalence of uniform moderate temperatures.

Stripping cover of conveyor belt showed mildew growth — the light colored areas surrounding the darker spot indicating the site of entry.



The G.T.M. and the "Cancer Cure"

But mildew doesn't attack Goodyear conveyors. Why? Because Goodyear offers you completely mildew-inhibited construction in all styles of conveyor belts. This special treatment—developed by the G.T.M. and proved by more than 20 years of service in thousands of belt installations—is one more reason why Goodyear belts give longer, more trouble-free service—and why more tons, the world over, are carried on Goodyear Conveyor Belts than on any other kind.

If premature belt failure is plaguing your conveyor operations, it will pay you to ask the G.T.M. for the story of mildew conquest. Get in touch with him through your nearest Goodyear Distributor, or by writing Goodyear, Akron 16, Ohio.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified COAL-FLO CONVEYOR BELTS
for UNDERGROUND SERVICE IN COAL MINES
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B
C
D
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B Sturdy, horseshoe-shaped breaker protects ply edges from fraying and wicking moisture
C Multi-plies of strong, sturdy fabric
D Rubber skim-coat between plies increases flex life
Mildew-inhibited throughout for protection against destructive effect of spores

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.*

GOODYEAR

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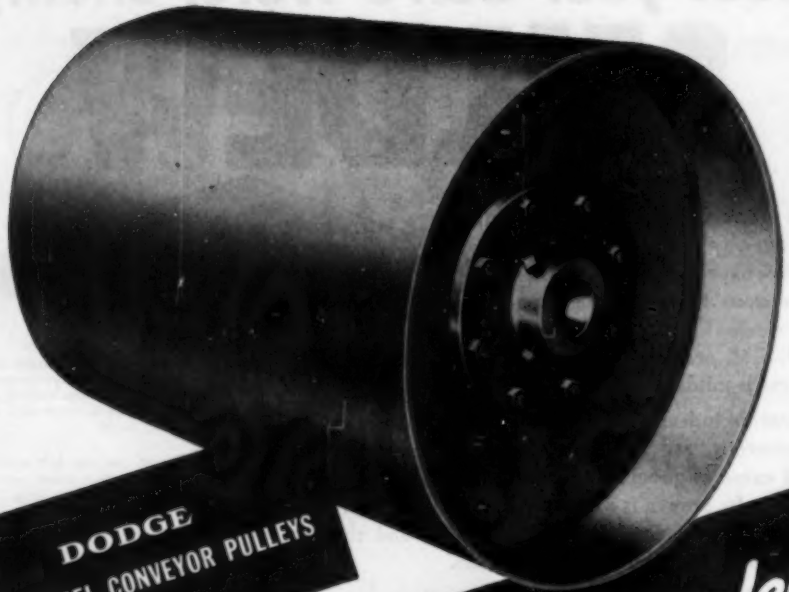

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SOLID STEEL CONVEYOR PULLEYS

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- The pulley for *modern* belt conveyors.
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- Accurately formed. Uniform rim thickness. Fully enclosed — to exclude dust, dirt, water.
- Diameters 6 in. to 8 ft., all face widths. Popular sizes stocked by our distributors.

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of Mishawaka, Ind.

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3000 Union Street, Mishawaka, Indiana

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified telephone directory.

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TORQUE-ARM SPEED REDUCERS

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ROLLING GRIP AND DIAMOND H CLUTCHES

GOODMAN MEETS THE

FOR SHORTWALL CUTTING MACHINES

A proved leader FOR UNDERCUTTING COAL EFFICIENTLY!

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2. Clear, concise maintenance-instruction manual and catalog, No. CM-100.
3. Assistance and advice of qualified Field Engineers and your local Carboloy Distributor.

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WEST VIRGINIA, MONTGOMERY
Marathon Coal Bit Co.

Mining Tool *this double benefit*

2 BETTER PERFORMANCE IN 8 VITAL WAYS

You get maximum efficiency and lower tool cost per ton because Carboloy Coal Mining Tools perform better 8 vital ways. Here they are:

1. Our tools cut more coal more freely in less time than any others would under the same conditions.
2. They last longer, for each tool has large insets of Carboloy Cemented Carbide, *hardest metal made by man*, combining high impact strength, toughness, near-diamond hardness.
3. You get more regrinds per tool.
4. Each tool stays sharper longer between grinds.
5. Carboloy Coal Mining Tools require less power.
6. They put less wear on machines.
7. Carboloy Coal Mining Tools reduce time spent in bit changing.
8. They require less time for reconditioning.

Why not get this bonus performance that's built into Carboloy Coal Mining Tools? See your nearest Authorized Carboloy Distributor or write direct.

CARBOLOY DEPARTMENT OF GENERAL ELECTRIC COMPANY
11120 E. 8 Mile Street, Detroit 32, Michigan

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

CARBOLOY

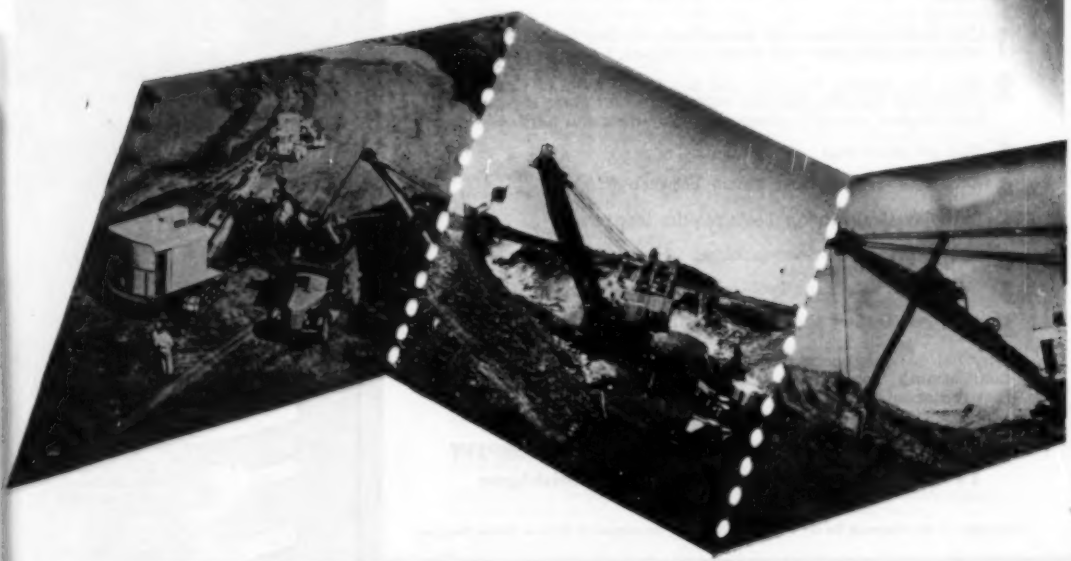
THE QUALITY BRAND OF COAL MINING TOOLS

LONGER ENGINE LIFE

because this lubricating oil also

CLEANS ENGINES

—and keeps them clean!

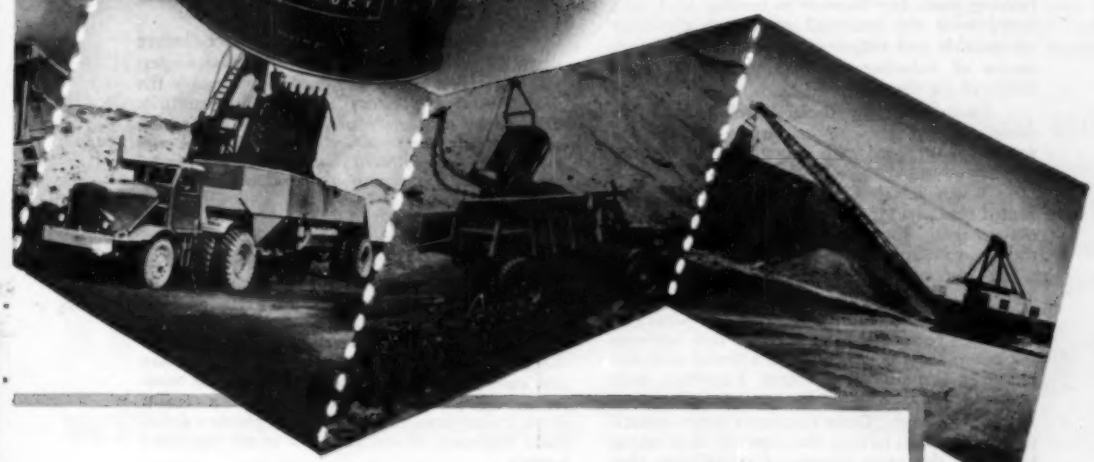


- No more lacquering of pistons, cylinders, valves.
- TENOL keeps valves and rings from sticking.
- TENOL prevents clogging of oil pump screens and oil channels.
- With TENOL, engines stay clean—free from harmful sludge and carbon.
- TENOL does not thin out at high temperatures, flows freely at low temperatures.
- Low oil consumption with full power, with TENOL.
- TENOL prevents corrosive wear of bearings and other parts.
- TENOL eliminates foaming.

For over 15 years . . . in all types of diesel and gasoline engines in rugged, heavy-duty service . . . Sinclair TENOL® has been doing an outstanding job. TENOL has proven it provides long periods of trouble-free operation at sustained high power output, with lowered upkeep costs.

Sinclair TENOL is not to be compared with many alleged "heavy-duty" oils. TENOL is the real thing! You can easily tell if an oil is actually "heavy-duty" . . . See if it is approved under new Military Specification MIL-O-2104. TENOL far surpasses this stringent Government standard!

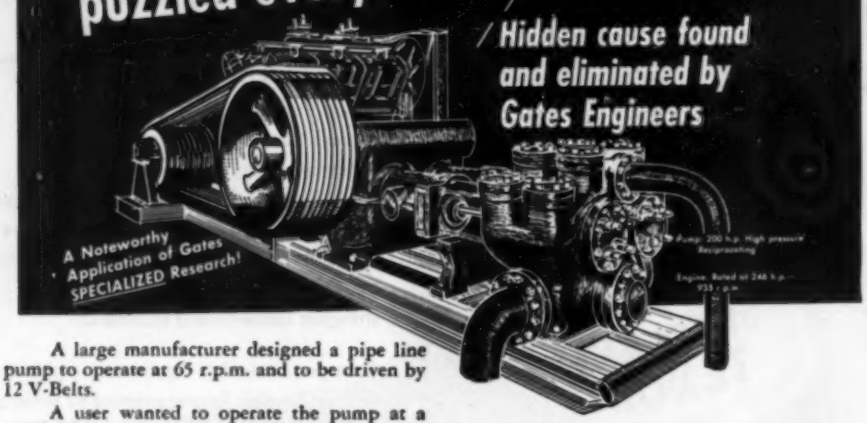
Save your valuable equipment — phone your nearest Sinclair Representative or write direct to Sinclair Refining Company, 600 Fifth Ave., New York 20, N. Y.



SINCLAIR TENOL
prolongs engine life

Severe vibration on pump drive puzzled everyone . . .

. . . Hidden cause found and eliminated by Gates Engineers



A large manufacturer designed a pipe line pump to operate at 65 r.p.m. and to be driven by 12 V-Belts.

A user wanted to operate the pump at a speed of 90 r.p.m. and realized that additional horsepower would be required. Upon checking the V-Belt drive, it was found that the additional belts required would increase the face width of the sheave and therefore the moment arm of the bearing load. Any increase in bearing load combined with the increased speed was distinctly undesirable and therefore the user sought some means of reducing the overhung weight and width of the sheave.

Learning that a *special* V-Belt had a sufficiently higher horsepower rating to gain the greater pump speed with *only 9 belts*, he had the drive re-designed to use these belts.

When installed on the job, the belts vibrated severely. At a speed somewhat below the desired range, the belts would fly completely off the sheaves. Operation was so rough that it was almost impossible to run the pump at all.

Gates Engineers were called in for consultation. Their analysis indicated that the particular belts used formed a *too-compliant* link between the pump and the engine. This allowed tortional vibration to build up to excess. Therefore, belts of *less compliance* would have to be used.

Accordingly, Gates Engineers wrote specifications for belts having the necessary h.p. rating but with the exact *degree of compliance* that would avert the vibration. These special V-Belts were built by Gates—installed—and the drive operates smoothly under all loads and at all speeds within the range.

The excessive vibration is gone. The clutch operates smoothly at any speed. And 13 additional pumps have since been equipped with identical belts—all operating most satisfactorily.

Gates ability to analyze and correct obscure drive difficulties is no accident—for Gates operates the largest V-Belt Testing Laboratories in the world. And Laboratory findings are carefully checked by tests made under actual field conditions. Finally, the *results* of these exhaustive tests are immediately reduced to *usable data* for the design of V-Belt drives to *perform whatever task may be required.*

Phone for a Gates Field Engineer

Only under exceptional circumstances, of course, will you ever need belts of special construction. But, more often, some drive in your plant may not be operating quite as it should. Or you may have a particularly difficult drive to design. Again, you may want to be sure what size and construction of V-Belts will give the most efficient and the lowest cost service on a certain drive. In any case, you have only to phone a Gates Field Engineer, *always near you* in all industrial centers.

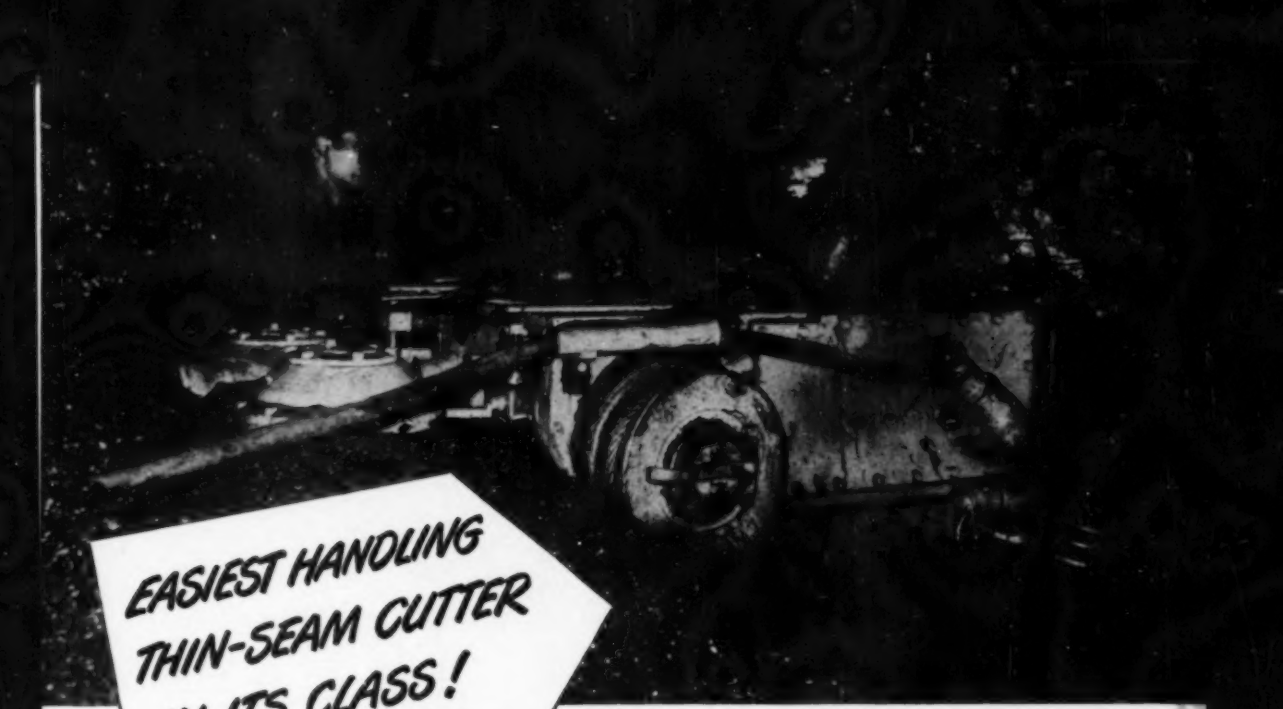
Just look in your phone book under "Gates Rubber." A Gates Field Engineer will come right to your plant and put at your service the full benefits of Gates V-Belt knowledge and experience *without the slightest obligation!*

ENG-518

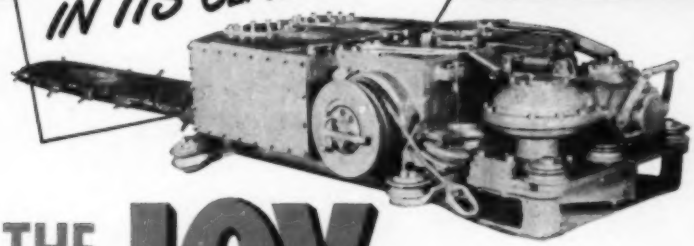
Gates
Hose V-Belts
Molded Rubber Goods
for Industry

VULCO ROPE DRIVES
ENGINEERING OFFICES AND JOBBER STOCKS
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
The World's Largest Makers of V-Belts
DENVER, U. S. A.



EASIEST HANDLING THIN-SEAM CUTTER IN ITS CLASS!



The JOY Bugduster operates on a non-clogging principle which permits passing large objects such as bits, slate and cap pieces. It eliminates kerf shoveling—frees one man for other duties. What's more, it requires no extra power—operating records show that keeping the cutter chain free of cuttings saves enough power to drive the bugduster.

THE JOY 11-B CUTTER with BUGDUSTER

SULMET CARBIDE BITS with exclusive self-locking Set Screws insure lowest bit cost per ton!

Only JOY Shortwall Cutters offer lever control for smooth operation of drum friction clutches. The JOY 11-B Cutter with Bugduster handles easily and smoothly, cuts faster and also saves time in the loading cycle, because the cuttings are piled in an even row for easier mechanical loading. With this cutter, props can be carried close to the face—its short length, low height and narrow width make it the ideal cutter for conveyor mining. On any basis of comparison in its class, the JOY 11-B Cutter with Bugduster will pile up extra profits for you—*let us show you actual performance figures!*

Write for Bulletins or

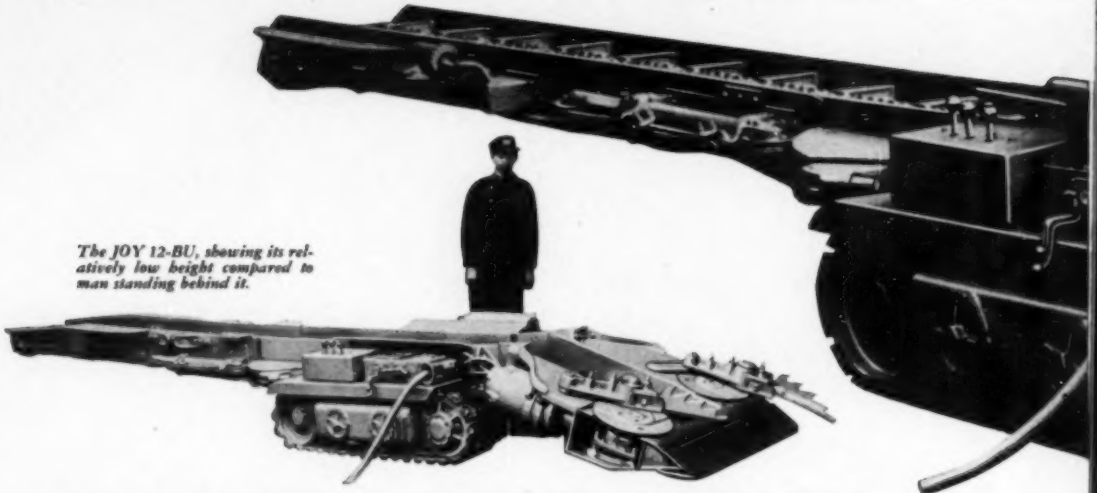
Consult a Joy Engineer

WSD-CL2840

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

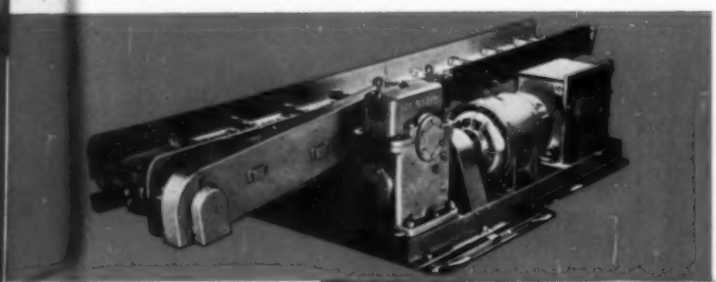
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



The JOY 12-BU, showing its relatively low height compared to man standing behind it.

JOY 12 BU-

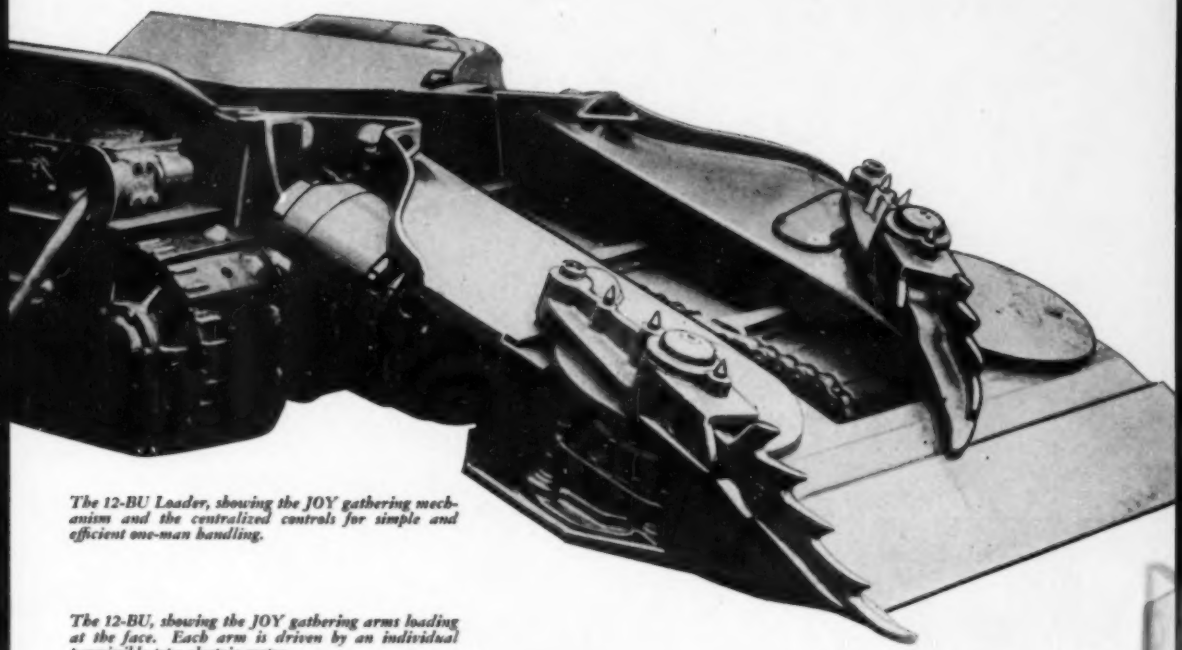
THE LOADER THAT SETS THE PACE IN LOW SEAMS



The JOY 12-BU Loader was designed and built specifically to cut costs in thin-seam operation. It is a mobile unit only 28¾″ high, which will operate efficiently in 30″ seams under proper conditions. Particularly suited for loading on conveyors in thin seams, but can be adapted for loading into mine cars in higher seams. The JOY articulated chain conveyor may be swung 45° either side of center. For details of the 12-BU, or other JOY Loaders to suit any mining condition, *write for bulletin.*

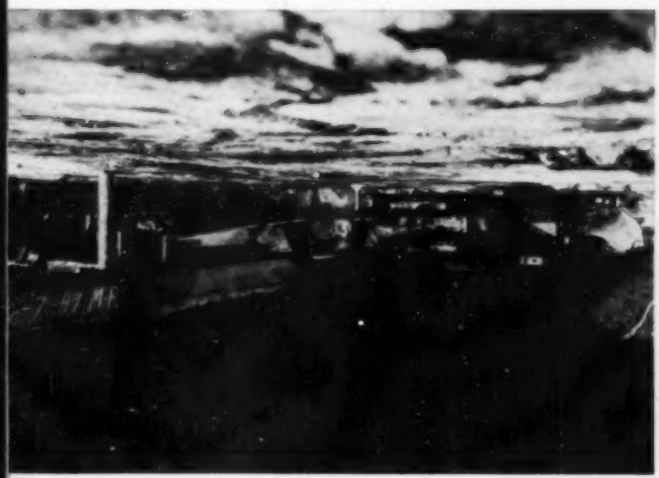
Perfect mate to the 12-BU in thin-seam mining—the JOY 15″ Chain Conveyor. Cut shows driving mechanism. Sections may be added for any desired length.

The 12-BU Loader working in a thin seam. The caterpillar treads are driven by individual motors. Permissible electric construction throughout . . . all parts in control system readily accessible.



The 12-BU Loader, showing the JOY gathering mechanism and the centralized controls for simple and efficient one-man handling.

The 12-BU, showing the JOY gathering arms loading at the face. Each arm is driven by an individual permissible-type electric motor.



The 12-BU loading in a thin seam. The entire machine has been ruggedly built for heavy-duty service and low maintenance.

Consult a Joy Engineer

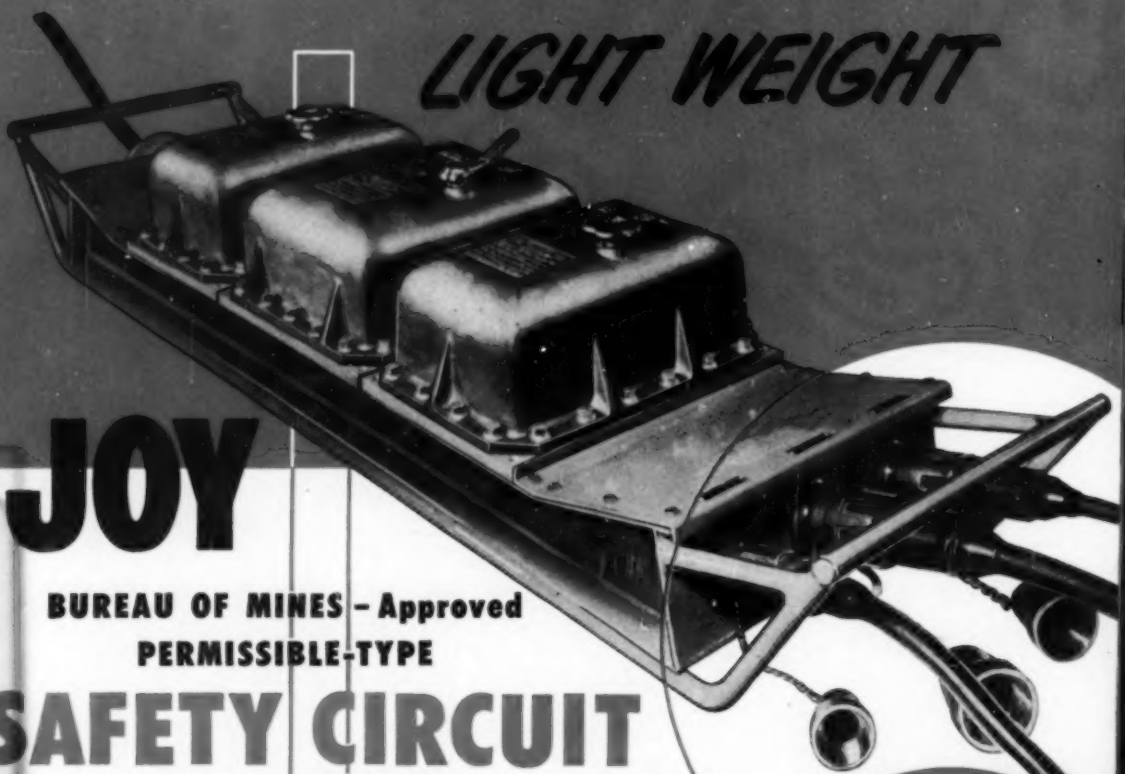
W&D CL 2092

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

NEW... LOW HEIGHT LIGHT WEIGHT



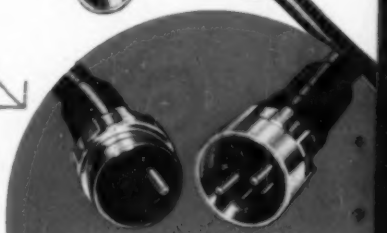
JOY

BUREAU OF MINES – Approved
PERMISSIBLE-TYPE

SAFETY CIRCUIT CENTER

for Thin Seam Mines

Only 15½" high and 19¾" wide for maximum compactness and portability in thin seams . . . this new 3-outlet Safety Circuit Center provides all the superior protective features found in larger JOY permissible units for the safe distribution of power to drills, cutters, loaders, conveyors, etc. in gassy mines. Protects men, machines and cable . . . is completely aluminum-housed . . . has aluminum skids . . . and can be transported on narrow belts. In the permissible style, the unit can be equipped with or without safety ground trip. Current ratings to meet your needs.



WITH PILOT PIN TYPE SPB CONNECTORS

Threaded metal couplings prevent accidental disconnects and insure water-tight connections. Larger sizes revolve on ball bearings.

Consult a Joy Engineer **for complete details and prices**

WBD ME 2245

JOY MANUFACTURING COMPANY

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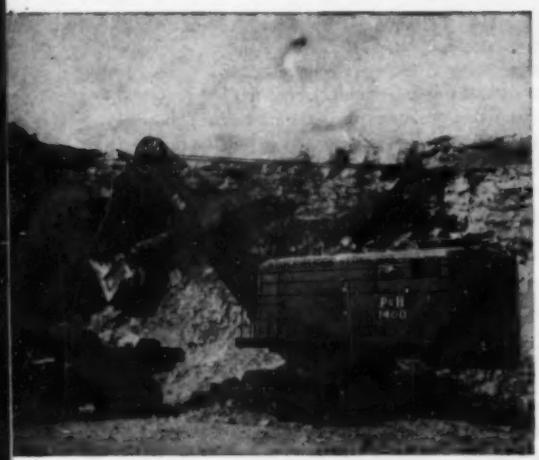
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

down come costs



These two P&H Electrics serve the same steel-making operation at Birmingham, Alabama. The Model 1600, owned by the Birmingham Slag Company, is loading blast furnace slag. The Model 1400, digging fluxing stone, is owned by the Stockbridge Stone Company.

with P&H ELECTRIC SHOVELS

Wherever these new P&H Electrics take over, costs go *down!* It couldn't be otherwise, with all the improvements that make for faster, smoother, more dependable digging.

There's Magnetorque* Hoist Drive, which gives you snappier dipper action with electro-magnetic power — completely eliminates hoist generator, hoist motor, slip friction clutch, and other mechanical devices.

There's P&H stepless power regulation — smoother, more accurate — and no control fingers or contactors to require maintenance or give you trouble.

There's tough, all-welded construction for extra strength without excess weight.

There's more — *much more* — see a P&H before you invest in new equipment of this type.

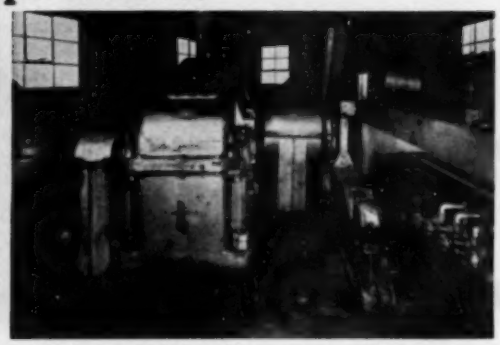
* Trade-mark of Harnischfeger Corporation for electro-magnetic type clutch.

P&H
ELECTRIC SHOVELS
4540 West National Avenue
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION

Every third P&H Electric Shovel sold is a repeat order

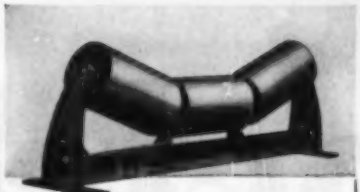
POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FAB HOMES

LINK-BELT engineering experience...



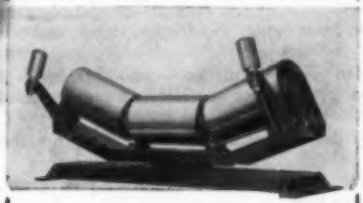
World's longest single belt conveyor, 10,900 feet from foot to head pulley, 30 inches wide, transports coal from preparation plant to river and rail loading station. *Left*, foot end at entrance to tunnel; *right*, head end, showing 200 H.P. herringbone gear drive and welded steel pulleys. Engineered, built and installed by Link-Belt.

Plus LINK-BELT quality components...



SERIES 100 TROUGHED BELT IDLERS. Strong, balanced integral rolls revolve on high-grade roller bearings, Grease-in, dirt-out seal, large reservoir preserve lubricant.

RUBBER-TREAD IMPACT IDLER for loading points protects the belt by absorbing the shock of heavy materials or lumps delivered from above.



BELT-TRAINING IDLER for automatic belt positioning. The actuating rolls respond to slightest contact — quickly recede and center the belt to minimize wear.

...add up to your best bet in

BELT CONVEYORS

WHAT'S your materials handling problem? Tonnage, distance or a combination of the two? Heavy or light materials? Large lumps or fines? Continuous or intermittent operation?

Whatever the conditions, you'll find the right answers at Link-Belt. For Link-Belt designs conveyor systems to meet your requirements. Backed by unmatched materials handling and power transmission experience, our conveyor specialists help you and your consultants get the right equipment in the right place.

One Source—One Responsibility

Link-Belt makes all the various elements — all types and sizes of idlers, takeups, pulleys, trippers, bearings and power transmission drives. Plus all related equipment — other types of conveyors, feeders, elevators, car dumpers and shakers.

And Link-Belt will build your supporting structures and enclosures . . . install the job completely. One source — one responsibility. Every detail receives the proper attention to assure you an efficient, trouble-free, long-life conveying system.

The next time you need belt conveyor engineering assistance, call the Link-Belt specialist in our office near you.

LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Springs (South Africa). 12.500-C

900 feet of trouble-free lubrication

• When operators of this midwest mine installed a conveyor in 1949, STANOBAR No. 2 Grease was selected as the lubricant for belt idler bearings on the recommendation of a Standard Oil lubrication specialist. Nine hundred feet long, and moving coal from mine bottom to tipple, the conveyor has boosted tonnage 300 to 400 tons a day.

There have been no bearing failures, no lubrication difficulties. STANOBAR is applied only twice a year.

STANOBAR's mechanical and chemical stability... the characteristics that have resulted in trouble-free lubrication of this conveyor . . . can also work to advantage in your own mine on a wide variety of jobs. Mine operators have found it especially valuable on ball and roller bearings which operate under a wide range of speeds and temperatures.

STANOBAR
TRADE MARK
Grease

A call to your local Standard Oil office is all that's necessary to put a Standard lubrication specialist to work on your problem. Or write: Standard Oil Company, 910 South Michigan Ave., Chicago 80, Ill.

What's your problem?

J. A. Grieve, lubrication specialist at Standard Oil's Decatur office helped this midwest mine make important savings with STANOBAR No. 2 Grease. He was close at hand, able to give mine operators the kind of service they needed when they needed it.

There's a corps of such lubrication specialists throughout the Midwest, one of whom is located near your own mine. Through special training, plus a background of practical experience, this man has a knowledge of lubrication that can mean real savings to you. To obtain his services, simply contact the nearest Standard Oil (Indiana) office. Discuss with him the savings you can make with such outstanding products as:

STANOIL Industrial Oils – Here's one line of oils that provides cleaner operation of loader and crane hydraulic units; supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants – On open gears and wire ropes, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire ropes.

STANDARD OIL COMPANY (STANDARD) *(Indiana)*

Wellman will build it

- Special Cranes
- Car Dumpers
- Gas Producer Plants
- Ore Bridges
- Charging Machines
- Forging Manipulators
- Gas Flue Systems
- Gas Reversing Valves
- Coke Pushers
- Mine Hoists
- Skip Hoists
- Clamshell Buckets

WELLMAN Car Dumpers

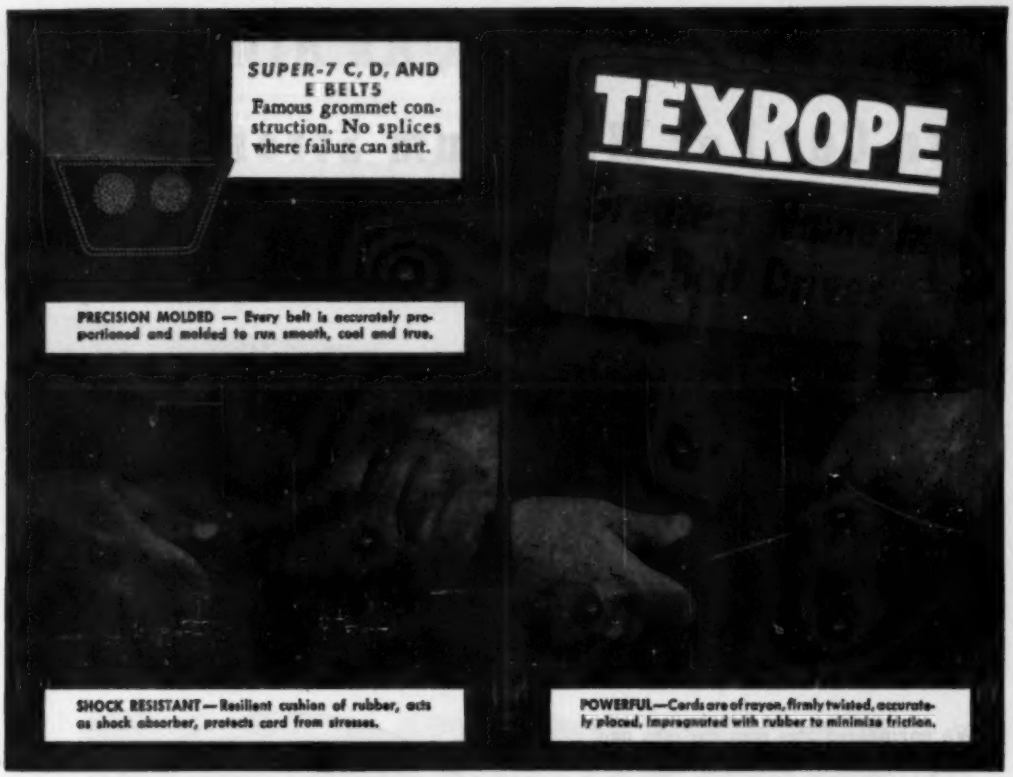
Select the right dumper from the most complete line

Wellman 60' 4-clamp Revolving Car Dumper.

• The complete line of Wellman Car Dumpers includes Lifting, Turnover, Traveling and Revolving Types. The Revolving Type is an example of Wellman's engineering skill. It is self-contained, requiring no external structures. A rack segment and pinion at each end of the frame turns each end equally, preventing distortion of the frame.

THE WELLMAN ENGINEERING COMPANY

7007 CENTRAL AVENUE • CLEVELAND 4, OHIO


SUPER-7 C, D, AND E BELTS
Famous grommet construction. No splices where failure can start.
TEXROPE
PRECISION MOLDED — Every belt is accurately proportioned and molded to run smooth, cool and true.
SHOCK RESISTANT — Resilient cushion of rubber, acts as shock absorber, protects cord from stresses.
POWERFUL — Cords are of rayon, firmly twisted, accurately placed, impregnated with rubber to minimize friction.

Cool Running...LONG LIVED!

SUPER-7 V-belts give long, satisfactory service even under bad conditions of load, shock and grit.

Tough, double-wrapped cover bias cut for elasticity and impregnated with rubber. Effectively seals out dust, grit, moisture; takes the wear; keeps the belt in shape; and protects cord structure.

But you get more than good belts when you standardize on *Super-7* V-belts. You also get the benefit of the greatest V-belt experience in the world both in the field and factory. You are assured of exactly the right drive for longest life from the wide variety of types and sizes available.

High Capacity Belts

Where space is limited or other special conditions demand heavier duty, the high capacity belt can be furnished in A, B, C, D, and E sections . . . Extra strong cords, special rubber cushion and tough Neoprene cover give them 40% greater capacity than standard belts at proportionately higher price.

V-Belt Drive Headquarters

Your nearby Allis-Chalmers Authorized Dealer or Sales Office can serve all your V-belt needs, whether they be new or replacement V-belts; standard and variable speed sheaves; or speed changers.

Get your copy of the revised 120 page *Texrope* Pre-Engineered Drive Manual from your A-C Dealer or Sales Office or write for Booklet 20B6956A. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-2212

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

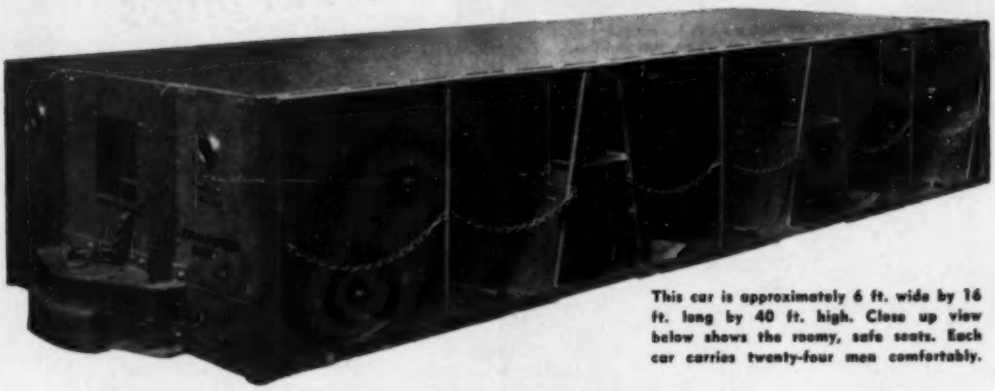
CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ½ in. to 72 in. discharge and up.

Texrope and Super-7 are Allis-Chalmers trademarks.

ALLIS-CHALMERS

From the Wheels Up, An All-Steel Man Car For Maximum Strength And Safety At Low Cost!



This car is approximately 6 ft. wide by 16 ft. long by 40 ft. high. Close up view below shows the roomy, safe seats. Each car carries twenty-four men comfortably.

We engineered this man car into one compact, all-steel unit for safety, comfort and low cost! Note that individual seats are an integral part of frame work and designed for maximum comfort. Result: minimum production cost which means you pay less. Note further that Sanford-Day's Man Car has no costly streamlined construction. More savings passed along to you. Safety at low cost has been the important factor. Top of the car is completely covered with high grade insulation for trolley wire protection.

Nothing has been overlooked to make this Sanford-Day Man Car your best possible buy for safe and efficient personnel transportation!

Investigate this Sanford-Day Man Car now! For complete information, write to us today!

SANFORD-DAY IRON WORKS

KNOXVILLE TENNESSEE

Devoting Our Entire Capacity to the Building of Better Mine Cars for Over— 50 YEARS

CLOSER TO COAL WITH EVERY PASS—Speed, easy handling and rugged ability make Internationals the favorites for coal strip mining near Pleasant View, Illinois.

DOUBLE EXPOSURE

AT PLEASANT VIEW

Two Internationals peel off clay and rock to expose coal at reduced cost for Paisley and Smith

Thirty feet beneath the pleasant view near Pleasant View, Illinois, is a coal layer well worth getting out. But first Paisley & Smith Company had to doze off a thick layer of heavy, sticky, wet clay, followed by a layer of rock.

They teamed up two big red Internationals—a TD-24 and a TD-18A—and did the job in jig time. Owner Smith and both operators were enthusiastic, and here's what they have to say:

"Both these tractors do a wonderful job for us," they report, "and the TD-24 is the best machine for a strip mine we know of. It's tremendously powerful and quick and easy to handle. It does more work than other tractors and does it at reduced cost!"

Ask your International Industrial Distributor today for the low-down on "Power that Pays." Check up on his service facilities and complete parts department. Then you'll know how he can keep your equipment in the field paying out in hard work over the years ahead.

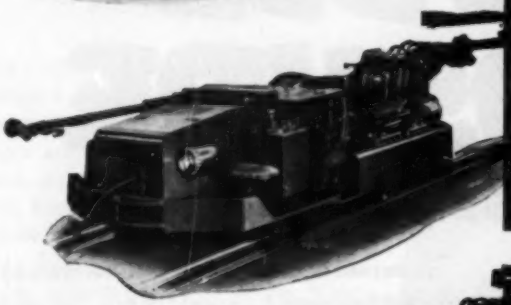
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

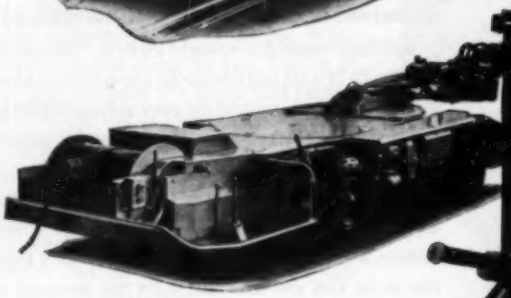
INTERNATIONAL IH **POWER THAT PAYS**

FOR

High Speed Drilling in Track or off-Track Mining

A TYPE AND SIZE TO MEET ANY REQUIREMENT





View above shows the Jeffrey 56-FHR Drilling Machine described on the opposite page (third one down). It is completely hydraulic in operation — will do a modern drilling job in trackless mines. Its many adjustments afford the utmost flexibility and permit proper placement of shot holes. There is a drill or drilling machine in the broad Jeffrey line to do your drilling job exactly. May we hear from you.

THE JEFFREY MANUFACTURING CO.

912 N. Fourth St. — **Columbus 16, Ohio**

DISTRICT SALES OFFICES

BALTIMORE 2, MD. Munsey Bldg.
BECKLEY, W. VA. 403 City Ave.
BIRMINGHAM 3, 2210 Third Ave., N.
BOSTON 16, 38 Newbury Street
BUFFALO 2, Jackson Building
CHICAGO 1, Bell Building
CINCINNATI 2, Carew Tower
CLEVELAND 15, 1560 Hanna Bldg.
DENVER 2, 1726 Champa Street
DETROIT 13, 5808 St. Jean Avenue
FORTY FORT, PA. 166 Slocum St.
HARLAN, Kentucky
HOUSTON 2, TEX. City National Bank Bldg.
JACKSONVILLE 2, Barnett Bank Building
MILWAUKEE 2, 735 N. Water Street
NEW YORK 7, 30 Church Street
PHILADELPHIA 3, Broad St. Station Bldg.
PITTSBURGH 22, Oliver Bldg.
SALT LAKE CITY 1, 101 W. 2nd South St.
ST. LOUIS 1, Railway Exchange Bldg.

SERVICE STATIONS

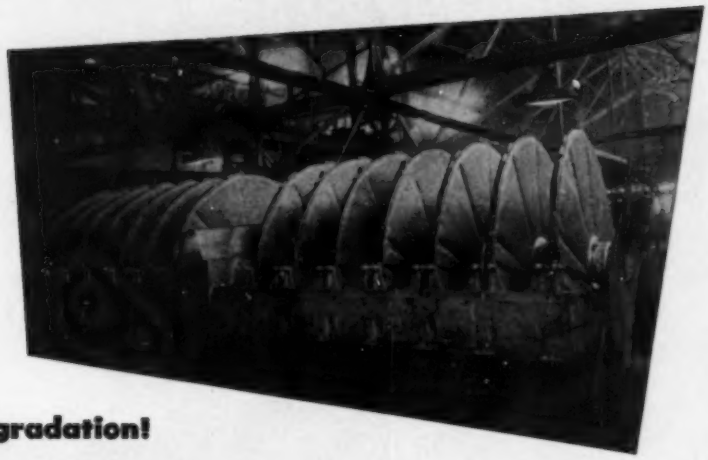
BIRMINGHAM • PITTSBURGH • JOHNSTOWN • FORTY FORT, PA. • MT. VERNON, ILL. • HARLAN, KY.
In West Virginia: BECKLEY — CABIN CREEK — LOGAN — MORGANTOWN — WELCH

ASSOCIATED COMPANIES

JEFFREY MFG. CO., LTD., Montreal, Canada
JEFFREY-GALION (PTY.), LTD., Johannesburg, S. A.
THE OHIO MALLEABLE IRON CO., Columbus, Ohio
THE GALION IRON WORKS & MFG. CO., Galion and Bucyrus, O.
GALION (GREAT BRITAIN) LTD., Wakefield, England
THE KILBOURNE & JACOBS MFG. CO., Columbus, Ohio
BRITISH JEFFREY-DIAMOND, LTD., Wakefield, England

- Bin Valves
- Bucket Elevators
- Car Pullers
- Chains
- Conveyors—(Chain or belt)
- Coal Cutters
- Continuous Mining Machines
- Crushers
- Drills
- Feeders
- Fans & Blowers
- Idlers (Belt)
- Jigs and Washers
- Loaders
- Locomotives
- Loading Booms
- Magnetic Separators
- Screens
- Shuttle Cars
- Transmission Machinery

DEWATERING FINE COAL



. . . without Degradation!

. . . with Clean Filtrate!

DO IT the American way. A play on words? Yes, but nowhere can you find a more effective, higher capacity unit for dewatering fine coal than the American Continuous Filter.

Better yet, nowhere can you find a unit which, considering the stream pollution problem confronting coal companies, will do what a real dewaterer is supposed to do: separate solids from liquids without letting the solids through in damaging percentages. Filtrate from the American Filter handling fine coal (⅛" and under) carries on the average less than 1% solids.

And best of all — you will find that all this effective dewatering takes place *without any degradation of product*. The coal is handled gently.

Bring your fines dewatering problem to Oliver United. We have laboratory facilities and field test units for determining the best filter station. And we have several types of dewaterers to complement the American where sizes are such as to call for a different filter.

New York 18 — 33 W. 42nd St. Chicago 1 — 221 N. LaSalle St.
Oakland 1 — 2900 Glascock St. San Francisco 11 — 260 Calif. St.
Export Sales Office — New York • Cable — OLIUNIFILT

FACTORIES:
Hazleton, Pa.
Oakland, Calif.

OLIVER UNITED FILTERS OUF INC. INC.

WORLD WIDE SALES, SERVICE AND MANUFACTURING FACILITIES

CANADA
E. Long, Ltd.
Orillia, Ontario

MEXICO & CENT. AMERICA
Oliver United Filters Inc.
Oakland, Calif.

INDIA
Dorr-Oliver (India) Ltd., Bombay

EUROPE & NORTH AFRICA
Dorr-Oliver S. A. Brussels
Dorr-Oliver S.N.a.R.L. Paris
Dorr g.m.b.h. Wiesbaden (16)
Dorr-Oliver Co., Ltd., London, S.W. 1
Dorr-Oliver S.a.R.L. Milano
Dorr-Oliver, N.V. Amsterdam-C

PHILIPPINE ISLANDS
E. J. Nell Co.
Manila

HAWAIIAN ISLANDS
Honolulu
A. R. Duvall

WEST INDIES
Wm. A. Powe — Havana

SOUTH AMERICA & ASIA
The Dorr Co.
Stamford, Conn.

AUSTRALIA
Hobart Duff Pty., Ltd.
Melbourne

SOUTH AFRICA
E. L. Bateman Pty., Ltd.
Johannesburg, Transvaal

Get the Tie that Lasts

(IT'S BETHLEHEM'S NO. 5 AND IT TAKES AN AWFUL BEATING)

Ten years is a pretty good proving-period for any product. It was just about ten years ago that Bethlehem launched its heavy No. 5 steel tie for 40-lb rail, and that decade has proved a whole lot about it. Mostly, we think, that the tie will take an unmerciful beating and still be around for the next one.

In this day and age, the demands on mine track are so severe that durability is a prime asset. Never before in coal-mining history have track loads been so heavy. Yet, in the face of these staggering tonnages, the No. 5 tie can often be taken up and reused 25 times or more.

Obviously it's a sturdy tie (weighs 5 lb per ft), but strength of metal isn't the whole story. Distribution of strength counts, too. Study the overall design; notice how the channel down the center provides added support where it is needed most. Strength at every point—strength properly applied and reinforced —*that's* the combination!

Yet there's nothing cumbersome about the No. 5. It's easy to handle, easy to slip into place. And so very simple to install. Merely fit the rail base against the stationary clip; tap the revolving clips into place. That's all there is to it.

Bethlehem's No. 5 is a handy fellow to have around a mine. It's the very basis of track that's good from the ground up. Won't you call us if there's more you'd like to know about this rugged tie?

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Yardley PLASTIC PIPE *for* water or waste disposal systems

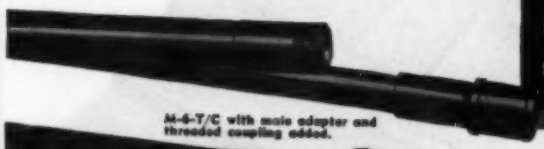
Whatever the need . . . for cold water or corrosive liquids, suction or discharge . . . there's a Yardley Plastic Pipe for the job.

Made from rigid or flexible light-weight material. Acid and alkali resistant. Won't rot, rust or corrode. Produced in a full range of pipe and tubing sizes, ⅛" through 6". Complete line of standard fittings and adapters. Easier to install, more economical to handle.

Send for chemical resistance charts.

M-6 with cement-type sleeve coupling.

M-2 flexible type.



M-6-T/C with male adapter and threaded coupling added.

M-1 with insert adapter attached

YARDLEY PLASTICS CO.

142 Parsons Ave. ADams 9315
Columbus 15, Ohio

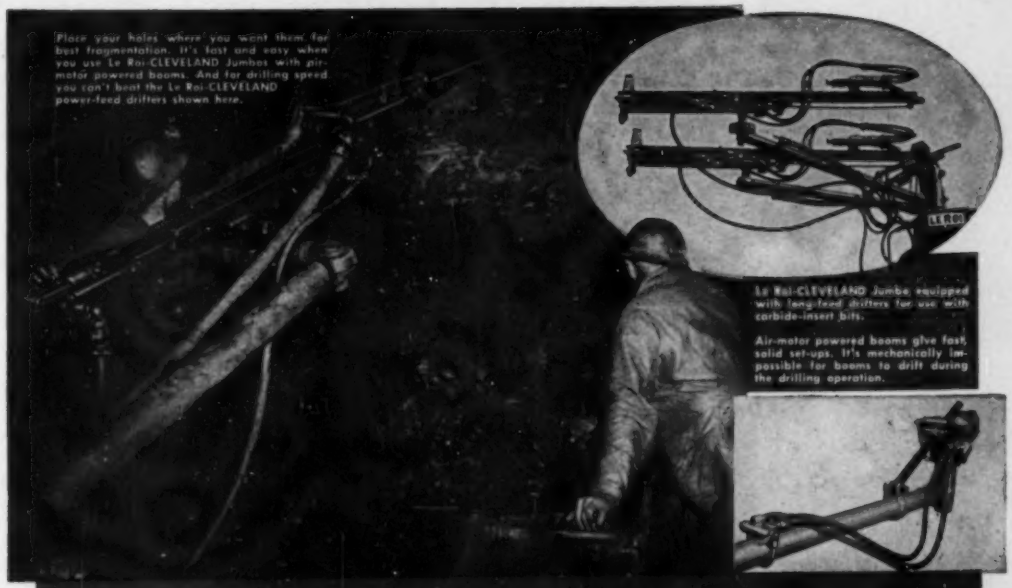
YARDLEY M-1 and M-2 FLEXIBLE PIPE SPECIFICATIONS

PIPE SIZE	NOMINAL O. D.	NOMINAL I. D.	CALCULATED B. P. P. S. I.	APPROXIMATE WT. PER FT.	NORMAL SHIPPING LENGTHS
½"	.820	.620	540#	.092	400' Coils
¾"	1.080	.840	350#	.141	400' Coils
1"	1.340	1.100	200#	.179	300' Coils
1¼"	1.660	1.360	200#	.263	300' Coils
1½"	1.900	1.610	200#	.357	250' Coils
2"	2.375	2.067	170#	.434	200' Coils
3"	3.500	3.068	165#	.899	100' Coils
4"	4.500	4.026	150#	1.220	25' Straight
6"	6.675	6.065	115#	2.400	25' Straight

YARDLEY M-6 AND M-6-T/C RIGID PIPE SPECIFICATIONS

PIPE SIZE	APPROXIMATE WT. PER FT.	NOMINAL I. D.	NOMINAL O. D.	CALCULATED BURST PRESSURE P.S.I. AT 80° F.
⅛"	.033	.476	.600	700
¾"	.080	.715	.855	625
1"	.138	.970	1.140	550
1¼"	.20	1.230	1.420	525
1½"	.32	1.510	1.730	490
2"	.45	2.00	2.250	400
3"	.555	3.000	3.250	375
4"	.880	4.000	4.300	342
6"	1.940	6.000	6.440	335

M-6 and M-6-T/C recommended for working pressures up to 20% of calculated bursting pressures where temperatures do not exceed 125°. For M-1 and M-2 working pressures, use 60% of calculated burst.


Place your holes where you want them for best fragmentation. It's fast and easy when you use Le Roi-CLEVELAND Jumbos with air-motor powered booms. And for drilling speed you can't beat the Le Roi-CLEVELAND power-feed drifters shown here.
Le Roi-CLEVELAND Jumbo equipped with long-feed drifters for use with carbide-insert bits.
Air-motor powered booms give fast, solid set-ups. It's mechanically impossible for booms to drift during the drilling operation.

Drilling-Cycle Time Reduced, Footage per Shift Increased

. . . when you use Le Roi-CLEVELAND Jumbos and power-feed drifters in your rock headings

THERE are three things you have to do if you want to save time in your drilling cycle and increase your footage — reduce set-up time, drill out the round faster, and shorten tear-down time.

You know this and so do we. That's why we designed the Le Roi-CLEVELAND jumbo the way it is. And that's also why our drifters drill so fast.

Let's see what you get when you use Le Roi-CLEVELAND:

★ The most flexible jumbo available. Air-motor powered booms let you space your holes quickly and easily for most efficient fragmentation.

★ Rigid, non-slip set-up feature keeps drifters in line, prevents steel binding, saves wear and tear on chucks, results in higher average drilling speeds.

★ Strong rotation, plus snappy yet powerful force of blow of Le Roi-CLEVELAND drifters gives you unexcelled drilling speed. This drilling speed coupled with the fast, positive feeding action of our power feed gives you the right pressure for fastest drilling and reduces drill-steel changing time.

You add all these advantages together when you use Le Roi-CLEVELAND jumbos and power-feed drifters. The outcome is faster drilling cycles, more footage per shift—so why not standardize on these cost-cutting honeys. Write for complete information.

LE ROI COMPANY

CLEVELAND ROCK DRILL DIVISION

12500 Berea Road, Cleveland 11, Ohio

53-42

MEMO FROM PURCHASING DEPT.

TO: Harry D—
Storekeeper

Expect to place your machine bolt order with Bethlehem shortly. Believe we may as well buy carriage bolts from them at same time. Let me know sizes you need.

A. C. Burt

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

ROCK RATED:

TO GIVE YOU MORE YEARS OF PROFIT

P&H MAGNETORQUE* ELECTRIC SWING

SAVES YOU TIME, TROUBLE, MONEY!

Bring on your heaviest going! The 955-A is ready for it! It's the 2½ yd. companion of the famous P&H 1055 — with all its proved engineering — tough all-welded construction — greater stability — live roller circle — adjustable hook rollers — and many other advancements that assure years of hard service with minimum cost.

Operating advantages? More than you've ever known in a machine of its size. Magnetorque Swing does away with the old swing frictions — with all their headaches — forever. It's faster — 15% to 25% faster.

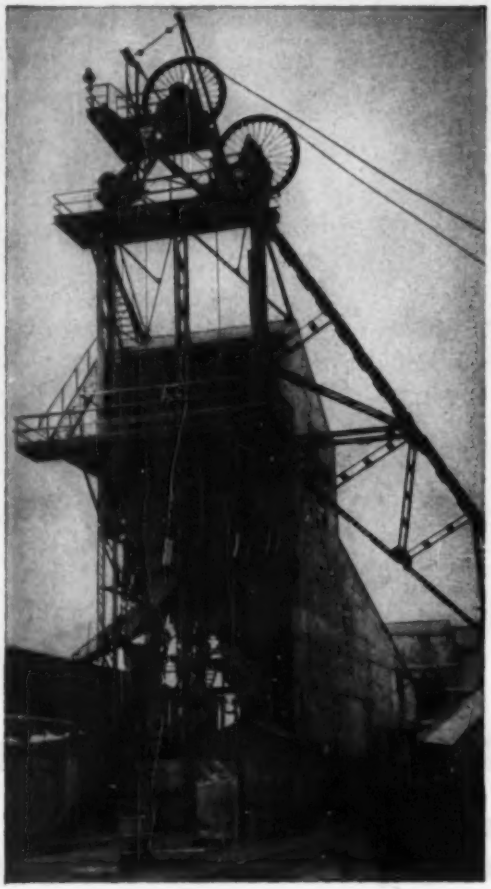
Ask us where you can see one in operation. Learn what "ROCK RATED" really means.

*T. M. of Harnischfeger Corporation for electro-magnetic type clutch.

P&H EXCAVATORS
4540 West National Avenue
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION

EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • CRAWLER AND TRUCK CRANES • DIESEL ENGINES • CANE LOADERS • PRE-ASSEMBLED HOMES

WIRE ROPE



You'll get smoother, cost-saving service with Roebling

"BLUE CENTER" STEEL wire rope is an exclusive Roebling development. Its high resistance to abrasion, shock and fatigue spells long life. In addition, Roebling Preforming gives you a rope that is easy to handle... has better spooling qualities... reduces vibration and whipping. This combination makes Preformed "Blue Center" Steel Wire Rope a top performer on the job.

Roebling makes a complete line of wire rope... there's a construction for every installation. Have your Roebling Field Man help choose the *right* rope for your equipment. Get his advice on the correct use and maintenance of wire rope. It is based on performance records on thousands of installations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

Atlanta, 934 Avon Ave ★ *Boston*, 51 Sleeper St ★ *Chicago*, 5525 W. Roosevelt Rd ★ *Cincinnati*, 3253 Fredonia Ave ★ *Cleveland*, 701 St. Clair Ave, N.E. ★ *Denver*, 4801 Jackson St ★ *Detroit*, 915 Fisher Building ★ *Houston*, 6216 Navigation Blvd ★ *Los Angeles*, 216 S. Alameda St ★ *New York*, 19 Rector St ★ *Odessa, Texas*, 1920 E. 2nd St ★ *Philadelphia*, 230 Vine St ★ *San Francisco*, 1740 17th St ★ *Seattle*, 900 1st Ave, S. ★ *Tulsa*, 321 N. Cheyenne St ★ Export Sales Office, *Trenton, N. J.*

Hewitt-Robins Conveyor Belting Lasts Longer Because It's Matched to the Load

Over the years, belt conveyor operators have found it's false economy to "cut corners" on their belting. The best belting they can buy has always proved *the best buy* . . . in extra months or years of service, freedom from repairs and ease of maintenance.

And what's "best" for one materials handling job isn't always best for another. That's why we make three types of belting: Maltese Cross® for the hardest, toughest jobs; Ajax® for general service, and Conservo® for lighter applications and portable conveyors.

Each is matched to the load it will carry. Ajax Underground Belting, for example, is designed for heavy-duty, around-the-clock underground coal mine service. Because it's built to take the hardest kind of punishment, it means bigger tonnage hauls at less cost.

There's a Hewitt-Robins conveyor belt for every bulk materials handling assignment, below and above ground. For the best buys in belting, call your Hewitt Rubber distributor (listed under "Rubber Products" in the classified phone book), or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, N. Y.

EVERYTHING YOU WANT IN CONVEYOR BELTING!

- **Hewitt-Robins belting is especially treated to resist the destructive action of moisture and mildew. High-grade frictions and liberal skim coat insure against ply-separation.**
- **Abrasion-resistant covers are made of extra tough rubber. Rigid-edge construction prevents curling . . . insures true troughing.**
- **Heavy textile reinforcement provides great strength with high flexibility.**
- **Dollar for dollar, you can't buy *longer belt life* anywhere!**

HEWITT-ROBINS
CONVEYOR BELTING

HEWITT-ROBINS (HR) **INCORPORATED**

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

For 24 Years Sinclair Coal Company Has Continually Expanded Its Facilities With . . .

McNally Coal Preparation Plants

Russell Kelce, fourth generation coal miner, from "the boy at the bottom of the shaft" to President of Sinclair and Southern Coal Companies, knows coal from the ground up.

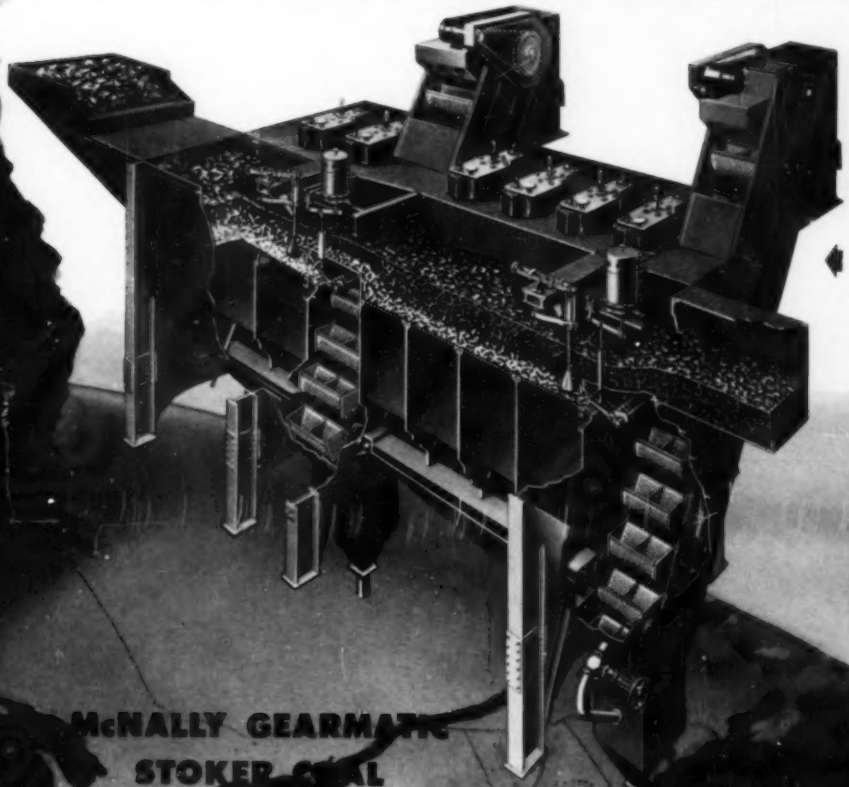
He knows that coal needs to be mechanically freed from its nature-bestowed impurities to give the user the greatest value for his coal dollar.

That is why the 23 producing strip mines in his far flung operations are all equipped to prepare coal to the differing specifications of power plants, railroads, industrial users, and even coal for home-heating furnaces.

It is significant that all of these preparation plants have been designed and manufactured by McNally Pittsburg. Each is a profitable operation in its own right and contributes substantially to the customer-satisfying Sinclair and Southern Coal Companies' service offered to coal users from the Rockies to the Atlantic.

Coal mine operators interested in exploring the possibilities of upgrading their coal are invited to talk it over with our consulting engineers whose service is offered without cost or obligation.

and Equipment to Meet
COAL BUYERS' SPECIFICATIONS



McNALLY MOGUL WASHER

The Mogul is capable of producing greatly increased tonnage of washed coal without extra shifts or without more man power.

The McNally Mogul Washer employs the baum jig principle used so successfully during the last two decades. It washes mixed sizes by making clean cut separation of the coal from the refuse.

LATEST IMPROVED DESIGN FEATURES

Hutch screw eliminated. **Note particularly this feature at the bottom of the washing cells. Maintenance eliminated on hutch screws.**

Improved impulse control valve **permitting greater sensitivity of adjustment.**

Submerged air valve exhaust. **Lowers obstruction at floor level. Eliminates forming of mess on top of washer.**

Write for Bulletin 451.

McNALLY GEARMATIC STOKER COAL CRUSHER

[illegible] advantages (1) high volume produc[illegible] accurate sizing, (3) low percentage of fines. Full flooding gearmatic drive housed in oil and dust-tight case permits perfect crushing roll adjustment over a range of 3 inches. Bulletin 751 describes this crusher and all of the others in the McNally line. Write for it.

(Reproduction of advertisement appearing in Fortune Magazine on opposite page)

McNALLY PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation—Manufac[illegible]
Engineering & Sales Offices: Pittsburgh • Chicag[illegible]

Packs a payload dirt cheap!

Boss truck of tough hauling jobs is International.

This has been true for 19 straight years. One reason is—Internationals pack bigger payloads for less money.

You can prove it just by counting the number of Internationals used by people in your business. Their records show International Trucks cost less to own and operate.

Why is this true?

Because International Trucks are available in 115 basic models, thousands of variations—you don't have to buy more truck than you need. And you never get less truck than you need.

What about the driver?

A driver takes better care of a truck he likes. He likes the new Internationals. He likes the Comfo-Vision Cab—"the roomiest on the road." He enjoys new riding comfort, improved visibility, greater ease of handling. He enjoys so many features that make his job easier, it's no wonder he likes International Trucks.

No wonder, either, that he makes them pay off on the job. Teamed with a new International Truck he makes the effort that can keep your hauling costs *dirt cheap.* Why not see your International Truck Dealer or Branch and find out how you can keep your hauling costs down with Internationals.

International Harvester Builds McCormick Farm Equipment and Farmall Tractors... Motor Trucks... Industrial Power... Refrigerators and Freezers

INTERNATIONAL HARVESTER COMPANY • CHICAGO

INTERNATIONAL TRUCKS

"Standard of the Highway"

Fast worker – reliable, too! This "Caterpillar" Diesel No. 12 Motor Grader is used by H. J. Williams, York, Pa., for maintaining roads on coal-stripping operations near Saxton. An essential tool in mining, it stands up under tough going—handles easily. As a military tool, it's essential for airport construction and maintenance, road construction, the establishment of bases and scores of other earthmoving jobs.

HOW TO GET MORE WORK FROM YOUR "CAT" MOTOR GRADER!

OUR COUNTRY'S defense needs have stepped up the demand for coal. Among the factors that help speed coal-stripping operations are good haul roads. To build, maintain and extend them, the "Caterpillar" Motor Grader has proved itself the No. 1 tool.

The speed, versatility and big work capacity that have made this machine essential to coal stripping have also made it essential to our armed forces. As military orders get first call, you may not be able to obtain prompt delivery of new machines. So it will pay you to plan now to get more work from your present equipment.

"Cat" Motor Graders are ruggedly built for long life. But good care on your part can lengthen that life span by thousands of extra service hours. Here's how:

1. **Follow the recommended *operating* care in your Operator's Instruction Book. Read and reread it.**
2. **Observe the *maintenance* suggestions in the Operator's Instruction Book. They're down-to-earth—experience has proved them practical and effective.**
3. **Anticipate your future replacement parts needs by seeing your "Caterpillar" dealer about them *now*. Don't wait until wear gets beyond repair—many a part can be rebuilt *if* serviced in time.**

You're in good hands when you work closely with your "Caterpillar" dealer. He is anxious to help you solve your problems. His service staff, service trucks and service facilities are ready to help you lick them.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

You're the Doctor

Preventive maintenance is good medicine for long life. Your Operator's Instruction Book is invaluable in the fight to conserve machine life. Follow the operation, lubrication and maintenance recommendations. When wear is evidenced in cutting edges, gears, tires or engine, see your "Caterpillar" dealer. He can help you prolong the life of your motor grader. Your motor grader is essential—don't abuse it.

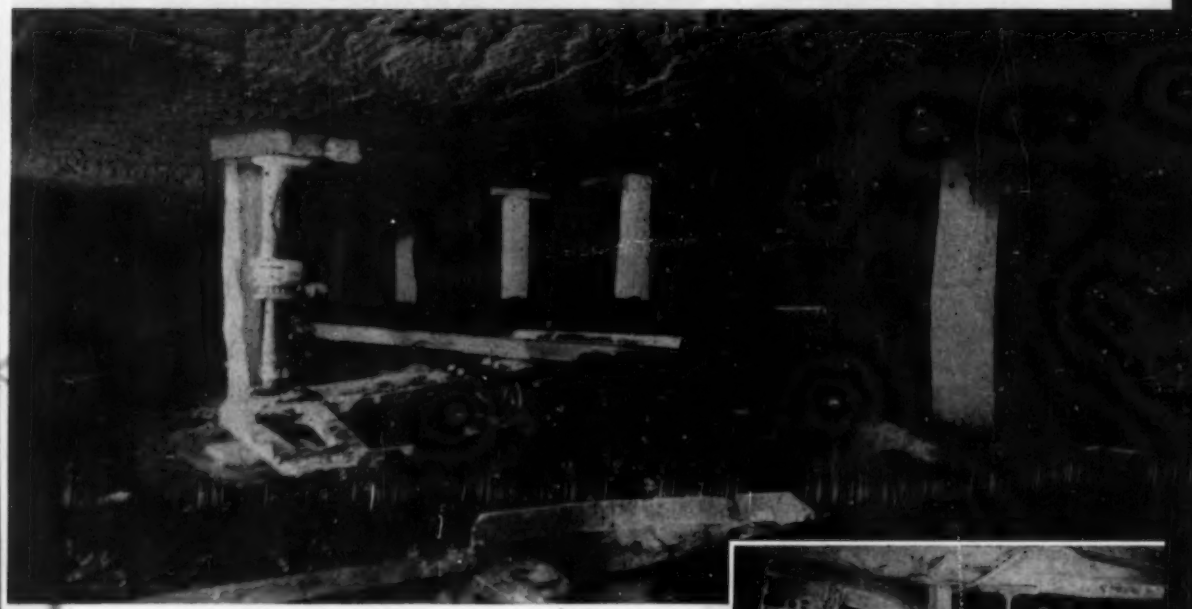
CATERPILLAR

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

IN CONVEYOR MINING

JOY SHAKERS

STAND AWAY OUT IN FRONT



Rugged · Foolproof Adaptable Better in Every Way—

JOY Shaker Conveyors move coal fast, efficiently, and *more dependably!* Wear and strain on the parts are reduced by the exclusive JOY "Cushion Stroke" drive, resulting in longer service life, fewer parts replacements, and lower operating and maintenance costs. • There's a combination of JOY Shakers and Conveyor Sections to handle any room and entry conditions—*write for Bulletin.*

Consult a Joy Engineer

JOY Shaker Conveyors are designed to meet any bend or turn requirements without slowing production.

A JOY Shaker loading into a JOY Elevating Conveyor.

The compact driving section of a JOY Shaker features the exclusive "Cushion Stroke" drive . . . may be placed anywhere along the length of the conveyor.

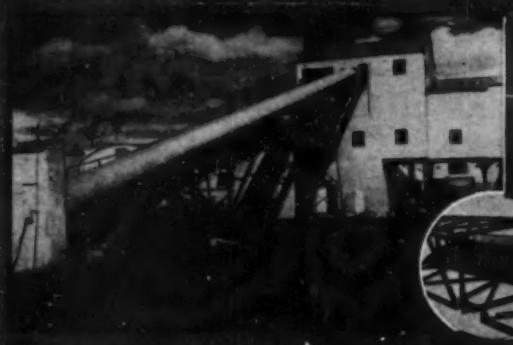
JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Barber-Greene

B-G MINE CONVEYOR SYSTEMS FROM ROOMNECK TO TIPPLE



B-G SLOPE CONVEYORS

B-G MAIN ENTRY BELT CONVEYORS

B-G PANEL BELT CONVEYORS

B-G Barber-Greene Company

It's Hungry for Work

If you're a regular user of Bethlehem wire rope, you well know how it's always given you a big dollar's worth of service; always earned its keep. Thinking back, you realize the staggering tonnages it's lifted or hauled . . . realize how well it's stuck with you in rugged going.

That's one thing you can depend upon. Bethlehem wire rope will stick with you. It's hungry for the full day's work, and it doesn't ask how tough the work will be.

THE GOING'S EASIER WITH FORM-SET

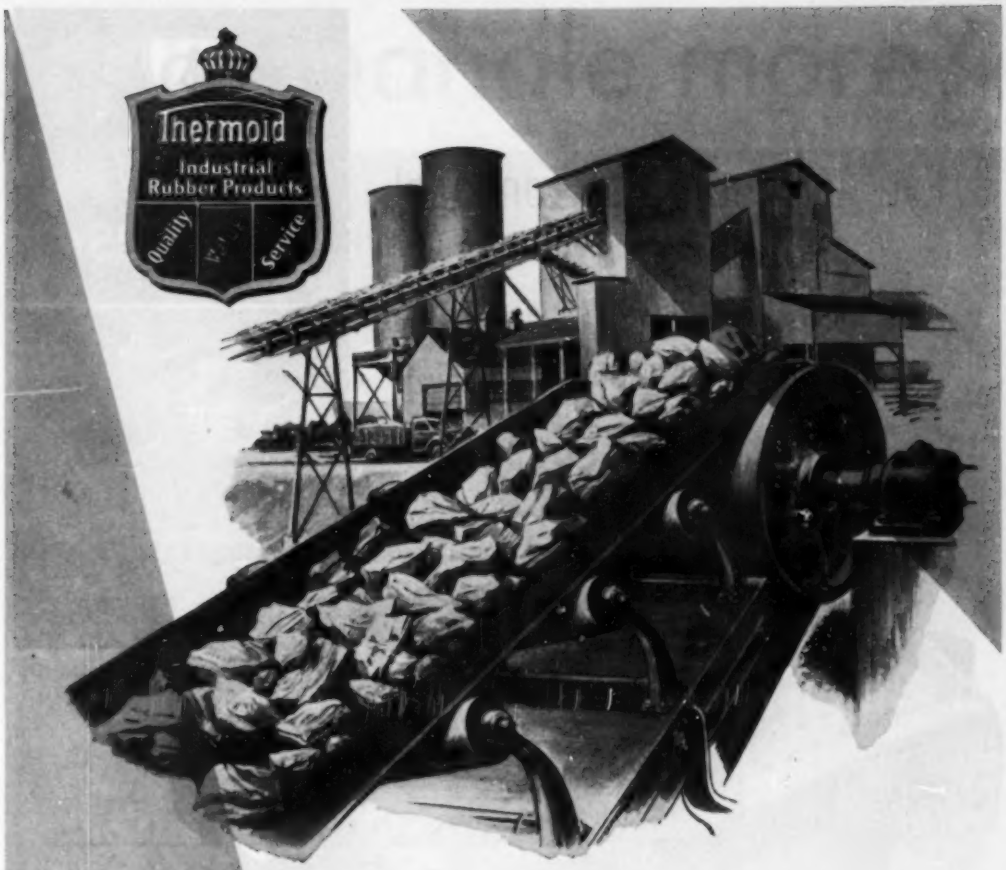
Tried Form-Set—Bethlehem's preformed wire rope? Form-Set now costs little more than the nonpreformed type. Because it so well resists bending-fatigue and kinking, and handles so nicely, we recommend it for a long list of uses. A really sound buy!

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM



"Whatever Your Conveyor Belting Problem . . . *Thermoid Has The Answer*"

Whatever the job—whatever the nature of the materials to be handled—heavy or light, soft or abrasive, hot or cold, wet or dry, uniform or non-uniform in size—there is a Thermoid belt built to do the job at the lowest cost per ton of material handled.

Thermoid belts are made with an extra margin of endurance. You will find they stay on the job long after ordinary belts fail. With Thermoid, you will have fewer delays due to belt breakage or premature wear. Your Thermoid distributor will be glad to help you with your requirements.

Here's The Book That Will Answer Many Of Your Questions

Drop us a line for your free copy of Book No. 3679. It is a handy reference guide, concise and complete. 16 pages of valuable charts, tables and graphs tell how to select the right conveyor or elevator belt for the materials to be handled . . . how to determine capacities, speeds, weights and number of plies.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Eye Accidents Cut Tonnage!

PROTECT

YOUR MINERS' EYES

with this INEXPENSIVE
All-Plastic Goggle

QUICK FACTS

- Fits all faces comfortably
- 4 point contact to face, resists rocking
- Snug-fitting, plastic nosepiece
- Many perforations for good ventilation
- Easily adjusted, elastic headband

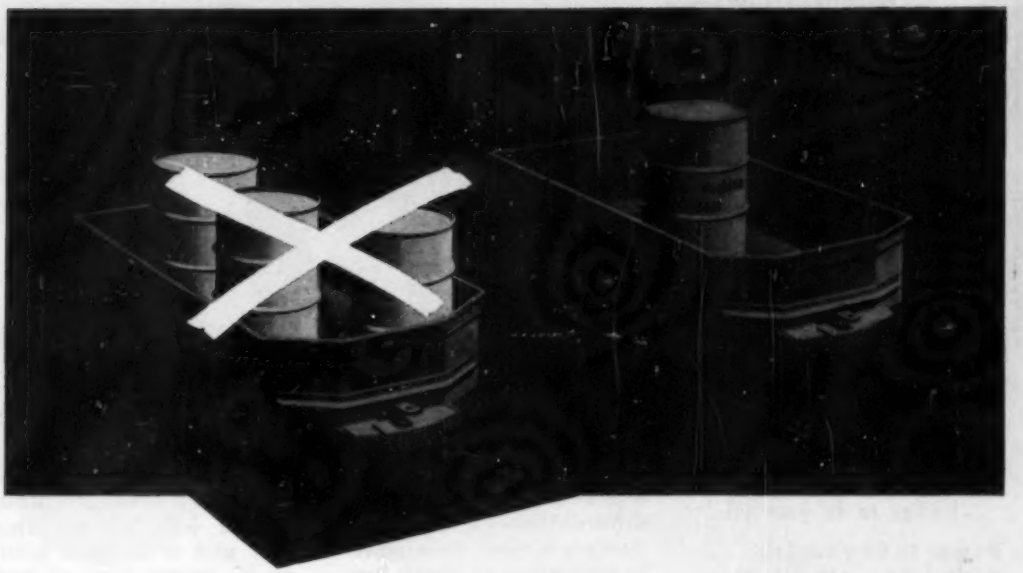
This one-piece goggle (AO 479) is recommended for protection against flying coal or mineral particles striking from the front or sides. Its impact-resisting plastic is "optically correct"—meets government specifications. Its wide angle vision is particularly desirable in the mines as are its NON FOGGING, WELL-VENTILATED and NON FLAMMABLE features. Can be worn comfortably under mining helmets and over most personal glasses. Your nearest MSA Representative can supply you.

AO's Industrial Vision Program increases production, decreases accidents. Write today for free booklet "Improved Industrial Vision."

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Why handle more?



Gulf Mining Machine Lubricant

does the job of 2 or 3 other lubricants

—and does it better!

Here's effective help in your efforts to reduce maintenance costs and simplify lubricant storage and handling—from oil house to face! When you use Gulf Mining Lubricant you can eliminate from 2 to 3 other lubricants depending on the type of equipment you operate. This means less confusion at the face, elimination of application mistakes, better lubrication.

At the same time Gulf Mining Machine Lubricant provides better protection for underground cutting and loading equipment: it resists leakage from gear cases; its superior lubricating value insures less wear; its exceptional adhesiveness prevents throwoff or channeling; and it resists the washing action of water.

Gulf Mining Machine Lubricant is equally effective for plain and antifriction bearings and for gears in drives and transmission.

To get the many benefits possible with this quality product, and for expert help in other phases of improved lubrication, call in a Gulf Lubrication Engineer. Write, wire, or phone your nearest Gulf office today.

Gulf Oil Corporation · Gulf Refining Company

GULF BUILDING, PITTSBURGH, PA.

FIFTY YEARS OF SERVICE

1901 GULF 1951

PETROLEUM AND ITS PRODUCTS

Increase your production

Check this 50-ton rear-dump

BIG

50-ton, 41-yd. capacity...
Custom-built for your needs... capacity from 35 to 50 tons ... bodies to fit your job.

Power to fit your job ...
Engines from 275 h.p. Diesel to 450 h.p. Butane... will fit your grade haul conditions.

Choice of transmissions ...
Conventional sliding-gear type... or constant-mesh type for instant speed changes.

***Torque converter available ...**
Automatically selects proper gear ratio, maximum power at all times, removes shock loads in power train.

17'x13' top on 50-ton body
Speeds up shovel or dragline loading, cuts spill at loader, reduces delays for spotting.

30.00x33 low-pressure tires ...
Give extra traction and flotation, longer tire life... absorb shock, help compact fills.

Power-proportioning differential ...
Delivers 4 times more power to drive wheel on firmest footing, pulls through mud, snow.

Fast, over-the-bank dump
Far more brake per ton than any other hauler. Drive wheels stay on solid ground for safe, fast pull-out.

Positive power steer ...
Push-button control of electric motor geared to king-pin gives safe control in any footing.

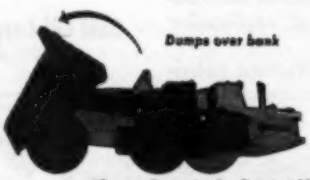
90° turns in 15' radius ...
Big 36' rig turns in less than its own length ... saves time spotting... saves time dumping.

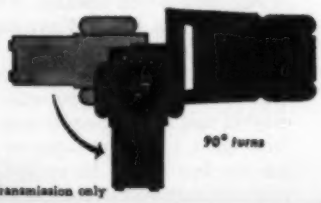
Reinforced steel grid bowl
Floored with ¾" tool steel over grid of 3" steel billets on 8" centers over ½" high carbon steel plate.

Complete self-cleaning ...
Body dumps with floor at 58° angle... induction heating available for winter work.

Simplified, rugged construction ...
No frames, sub-frames, springs, drive shafts, or hydraulic systems to maintain, repair, delay.

4-wheel air brakes ...
Multiple-disc ... 4792 sq. in. total braking surface, far more than other heavy haulers.





*Torque Converter for Constant-Mesh Transmission only

R. G. LeTOURNEAU, INC.
PEORIA, ILLINOIS

Your LeTourneau Distributor will be glad to give you application facts and figures on this big "A" Tournarocker.

with model A Tournarocker

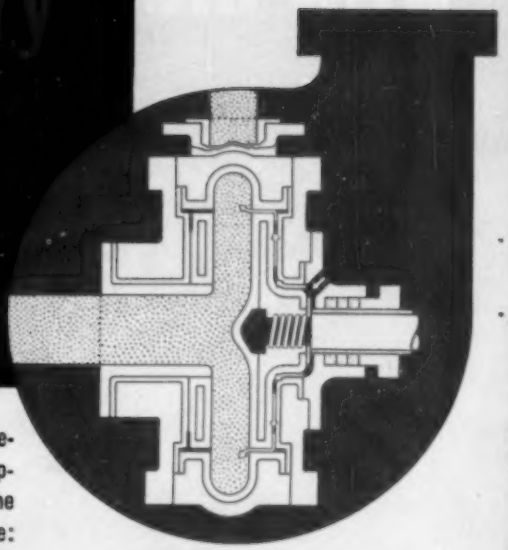
Here are a few of the leading concerns now using high-speed, rear-dump TOURNAROCKERS

Babler & Rogers.....*Oregon*
Bagdad Copper Corporation..*Ariz.*
Roy L. Bair Co.....*Washington*
Barrage de l'Iril Emda....*Algeria*
Bates & Rogers.....*Illinois*
J. Robert Bazley, Inc.....*Penn.*
Billiton Mines.....*Surinam*
Adolph Bockus.....*Ohio*
Borderland Colleries.....*W. Va.*
Constructores Nacionales...*Mex.*
Dunn Limestone Co.....*Indiana*
Ft. Hartford Stone Quarry....*Ky.*
General Construction Co...*Wash.*
Grand Rapids Gravel Co....*Mich.*
Carl M. Halvorson.....*Oregon*
Horner & Switzer.....*Colorado*
Vernie Jarl.....*Oregon*
Leonard & Slate Ltd.
and E. C. Hall.....*Oregon*
Marsh Construction Co....*Illinois*
McGraw Construction Co....*Ohio*
Monolith Portland Cement Co....
.....*California*
Morrison-Knudsen Co., Inc.....
.....*British Columbia*
Muskoka Construction Co., Ltd...
.....*Ontario*
Nya Asfalt Aktiebolaget and
Svenska Vag Aktiebolaget.....
.....*Sweden*
Fred Onuparik Construction Co...
.....*Connecticut*
Orange Construction Co...*W. Va.*
Republic Steel Co.....*Alabama*
Skousen-Hise Contracting Co....
.....*New Mexico*
John Stark.....*Kansas*
Sydvaranger, A/S.....*Norway*
United Province Government.....
.....*India*
T. W. Ward Co., Ltd.....*England*
Frank W. Whitcomb Construction Corp.....*New Hampshire*
B. G. Young & Sons....*Tennessee*

R. G. Le Tourneau, Inc.

PEORIA, ILLINOIS

The Inside Story OF PUMP ECONOMY



Million-ton-plus performance on harsh abrasives, with no appreciable loss in efficiency, capacity, or head . . . low power consumption . . . simple, inexpensive maintenance. Here are some of the design features of Hydroseals that make these results possible:

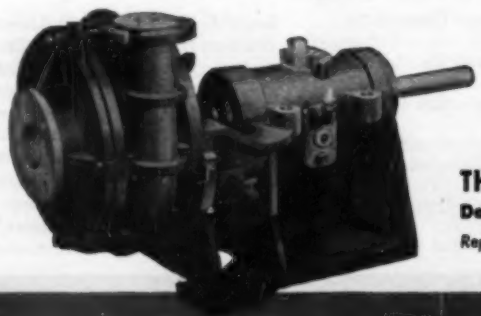
High Efficiency—Clear sealing water protects close clearances from abrasive wear. Initial high efficiencies are thus maintained throughout pump life. No adjustments, take-up, speed changes, etc., are necessary.

Power Savings—Maintained efficiency means that you don't need to install an oversize pump and motor in order to allow for wear. Power costs are reduced as much as ⅓ to ½.

Long Life—Abrasives bounce off the super-tough Maximix Rubber Parts, which outlast metal 4 to 6 times or more. Special alloys are used for coarse material service. Heavy-duty, anti-friction radial and thrust bearings are standard.

Easy Maintenance—All Maximix Rubber Parts are moulded to shape and are mechanically locked into correct position . . . no cementing or vulcanizing is needed. Your own men can make any repairs quickly in the field.

Low Cost Replacements—Besides being low in cost, Maximix Rubber Parts weigh 80% less than equivalent metal parts . . . easy to handle, inexpensive to ship.



Compare these advantages with those of any other abrasives-handling pumps, and you'll see why so many milling engineers like to have Hydroseals working for them. Write for Catalog No. 451.

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. D—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives in Most Principal Cities

HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

SPECIFY

UPSON-WALTON

BRATTICE CLOTH

Upson-Walton dry-proofed brattice cloth is available in standard and heavy weights.

Always *dry*— Always flame-proof

FLAME-PROOFING of Upson-Walton dry-proofed brattice cloth does not depend on moisture, absorbed by chemicals. The chemicals used in treating Upson-Walton cloth flame-proof the cloth directly, and are not designed to absorb moisture for this purpose. Thus you can rely on this flame-proofing—under all conditions.

There are other advantages. Since it does not soak up moisture, Upson-Walton cloth weighs less. Grade for grade, weight is cut as much as 15%. This means easier handling and lower costs.

With a dry-proofed cloth, fungus growths have less chance to start. Thus the cloth gives longer service, and can be re-hung. For added safety and economy, specify Upson-Walton when you need brattice cloth.

THE UPSON-WALTON COMPANY
CLEVELAND, OHIO
NEW YORK • CHICAGO • PITTSBURGH

Want Facts?

For a copy of "Brattice Cloth Facts", which includes samples of cloth, just send the coupon.

The Upson-Walton Company
12500 Elmwood, Cleveland, Ohio
Please send copy of "Brattice Cloth Facts".

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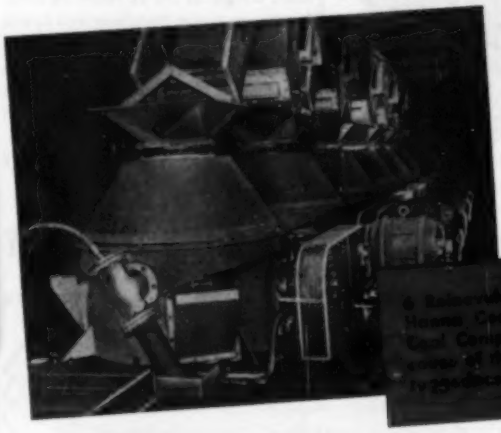
WIRE ROPE • ROPE FITTINGS • BRATTICE CLOTH • TACKLE BLOCKS

THE DRYING DUTCHMAN

For Better Drying of Fine Coals

The Dryer consists of two conical drums, one turning inside the other, with a slight difference in speed of rotation. The outer drum is coarsely perforated, the perforations being covered by easily accessible basket-screens having small openings. The inner drum is provided with helical ribs which convey the coal downward to the discharge of the Dryer. The water is expelled from the coal by centrifugal action through the perforations. The Dryer may be driven through a V-Belt transmission or connected directly through a flexible coupling.

The Drying Dutchman is designed to operate at a Rotor Speed of 680 rpm. The feed to the drying basket is distributed carefully to the inner part of the retaining basket. The low rotor speed enables the degree of degradation to be minimized without sacrificing low moisture of the product.



GREATER RECOVERY OF FINE SIZES . . . The loss of the fine sizes of coal in the effluent is held to an absolute minimum due to the small amount of degradation produced in the Dryer. The effluent varies between 10% to 18% of solids. The size-consist of the effluent is essentially minus 28 mesh.

HIGHER CAPACITY . . . The normal capacity of the Dryer is 50 to 75 tons per hour, requiring 60 to 75 HP Drive. The Dryer is capable of handling much higher tonnage to compensate for surge conditions in the normal operating day.

THE LOW MAINTENANCE COST . . . is due to the rugged construction, superior mechanical design and precision workmanship.

CAKE MOISTURE . . . In coals of average screen analysis it is possible to maintain consistently 6½ % surface moisture in ¼ x 0 Dried Coal.

SMALL SPACE REQUIREMENTS . . . The Dryer can be mounted in an area 6 ft. square and requires approximately 5½ ft. of headroom. Its weight is only 12,000 lbs., without drive.

COMPLETE STOCK OF REPAIR PARTS

We are carrying a complete stock of repair parts in Pittsburgh, Pa. We guarantee the same availability and service that have been a Heyl & Patterson standard for more than 60 years.

Heyl & Patterson, Inc.
"SINCE 1887"
55 WATER STREET · PITTSBURGH 22, PA

Coal Preparation Plants
Coal & Coke Handling Equipment
Bradford Breakers
Coal Crushers
Boat Loaders and Unloaders
Coal Storage Bridges
Car Hauls and Boat Movers
Railroad Car Dumpers
Rotary Mine Car Dumpers
Refuse Disposal Cars
Thorsten Coal Sampling Systems
Cyclone Thickeners
Thermal Dryers
Kinney Car Unloaders

MORE MILES OF MOTIO

Homocord CONVEYOR

Round and round—up and down they go, taking the hard impact of heavy loading . . . and still coming back for more . . .

Users tell us there are more ton-miles of rugged service in Homocord Conveyor Belts than in any other. This is not accidental; we engineered Homocord specially for heavy duty conveying. It cushions load-impact. It troughs naturally, needs less training. It's flexible, yet it's strong.

Bulletin 6906, mailed on request, presents convincing proof.

Our hose, V-belts and flat belts, too, are engineered for extra long life. Ask your R/M Representative.

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Tonnage increased over 10%—

Costs reduced materially, with

Baker-Fletcher Roof Drill and Wrench

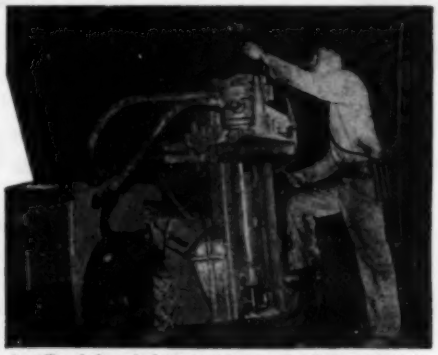
● This rugged and compact self-tramming permissible drilling and bolting machine is setting new performance standards. At a large operation in Indiana, for example, it established the following records:

Average number of bolts per shift	over 100
Maximum number per shift	175
Fastest time for one room (9 bolts)	20 min.
Drilling speeds	Better than 10 ft. per min.
Bolt tightening time	3 seconds
Height of seam	5½ ft.
Length of bolts	5 ft.
Composition of roof	Dense slate and sulphur balls
Life of drill bits (standard carbide tipped) before resharpening	250 feet
Other benefits	(only 2 bits required per shift) Tonnage improved over 10%, roof control cost materially reduced.

Illustrations and captions show how it operates.

Machine trams into position, ready for drilling. Full speed range hydraulic tram in either direction with third wheel steer, allows operator to position quickly for each hole. Bolts, plates, expansion shells, and drill steels are carried in tray on machine.

Drilling the hole. Special torque-controlled feed allows operator to drill at almost unbelievable speeds. Increases bit life, too. Rigid straight line motion makes hole true, permits high feed pressure for drilling hardest rock.



Installing bolt and plate. At the turn of a lever, wrench is ready to bring the bolt up tight. No auxiliary wrenches are needed to obtain high speed, high volume bolting. Hydraulic control assures constant torque on bolt.

Before you buy roof control equipment, get all the facts about this new Baker-Fletcher Roof Drill and Wrench.

Manufactured by

THE BAKER-RAULANG CO.

1213 West 80th Street • • • Cleveland 4, Ohio

Exclusive Coal Mine Representatives

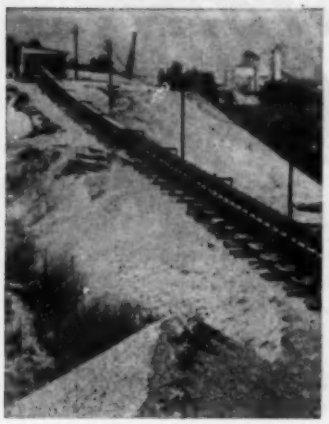
J. H. FLETCHER & CO.

Chicago, Illinois • • Huntington, W. Virginia

Baker MINE EQUIPMENT

For heavy-duty conveyors . . .

IT'S TIMKEN®...AND TIMKEN AND TIMKEN AGAIN!



In use since 1944 at the Ohio Sand & Gravel Company, Cincinnati, Ohio, this 634-foot Continental Gin Company belt conveyor handles 275 tons of gravel per hour. Timken bearings in the idlers assure long idler life, less friction, minimum maintenance.

Carrying limestone or flux from storage to distributing system, this reclamation conveyor uses Timken bearing equipped Rex Idlers, has a 36"-wide belt and handles 450 tons per hour. It's located at Kaiser Company, Inc., Iron & Steel Division.

This conveyor belt system, used to stack limestone at the Inland Limestone Company, Manistique, Michigan, has been in operation 21 years. It was built and installed by Stephens-Adamson Mfg. Co., and uses Timken bearing equipped idlers.

AND HERE ARE 6 BIG REASONS WHY:

1 THOROUGHLY PROVED. The Timken® bearing is the only tapered roller bearing proved by 15 years or more of service in heavy duty conveyor installations using the popular dead shaft construction.

2 EXTRA CAPACITY. Line contact between rollers and races gives Timken bearings high load capacity. And by using Timken bearings sizes that are mass produced for the automotive industry, you get extra capacity bearings that actually cost *less* than the smaller sizes you'd normally use.

3 LONG-LIFE LUBRICATION. Not just lubricated for "life" but lubricated yearly or as conditions require to insure *long* life. Fresh lubricant ends gummy, sticky, jammed bearings.

4 LONGER ROLLER AND BELT LIFE. Less sliding and scuffing between idlers and belt.

5 FRICTION MINIMIZED. Timken bearings' true rolling motion and extremely smooth surface finish practically eliminate friction.

6 MAINTENANCE REDUCED. Long life and dependable performance of Timken tapered roller bearings cut maintenance to a minimum.

Remember "Timken" is not a bearing type. It is a trademark applying only to bearings made by The Timken Roller Bearing Company. Always insist on Timken bearings in the conveyors you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

Wherever the going's tough industry turns to

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◐ AND THRUST →◐← LOADS OR ANY COMBINATION ✳

"Thar's GOLD in Slurry Hills!"

The C-M-I centrifugal DRYER is the Efficient and Profitable method of recovering SLURRY and turning it into Black, Gleaming Nuggets of SALABLE COAL!

- ***Here is Efficiency!*** The C-M-I Dryer will reduce the water content of 28 tons of slurry from 82⅛ to 7½ % in less than one hour!
- ***Here is Profit!*** Figures submitted by operators using the C-M-I Dryer show that in slurry salvage alone, the extra profits will pay for the equipment in a few months time.
- ***Here is Capacity!*** The large C-M-I Dryer will handle over 75 tons of ⅜" x 28 mesh coal per hour, reducing the water content from 25% of surface moisture to 6%.
- ***Here is Durability!*** All parts are fabricated from the best materials obtainable. Friction-free bearings and gears are assured of a cool, clean supply of oil at all times. Revolving parts are dynamically balanced on the latest type of balancing machine.
- ***Here is Economy!*** In many instances, the C-M-I Dryer eliminates costly heat drying altogether. In others, it reduces greatly the amount of heat drying normally required.

And it's all in the

C-M-I DRYER

If you are interested in how your dewatering problems may be solved with a C-M-I Dryer, write to us, stating the material, its specific gravity, its sizing, such as the percentage on 8 mesh, 10 mesh, 20 mesh, 35 mesh, 65 mesh and 100 mesh standard Tyler screens, and also the amount passing through 100 mesh. A gallon sample of the material in the state it would be fed to the centrifugal would be helpful. We will size up your problem at no obligation to you.

CENTRIFUGAL and MECHANICAL INDUSTRIES, Inc.
146 PRESIDENT STREET ST. LOUIS 18, MO.

SERVICE HOURS

...*not Footage*

The True Yardstick of Air Hose Value

When buying air hose, your thinking should not be in terms of footage-per-dollar but rather in terms of service hours.

Experience tells you that the hose which is built with an *extra* measure of strength, flexibility, damage resistance and safety is surely your soundest investment.

This is true of *every* BWH Air Hose. Each has been specifically developed, tested and field-proven to give maximum long, trouble-free life in its job.

Get in touch with your BWH distributor — *today*.

BWH

DEPENDABLE RUGGEDNESS

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS.
P.O. BOX 1071, BOSTON 3, MASS., U.S.A.
Warehouse Stock, 111 N. Canal St., Chicago, Ill.

CONCORD AIR — An extra quality, exceptionally rugged hose for toughest use on air drill and pneumatic service in mines, quarries and construction jobs. Non-porous tube resists heat and oil. High tensile cotton yarn braid reinforced carcass. Tough grey cover resists cutting, gouging, abrasion. 7 sizes from ¼" 2-braid through 2" 3-braid. 200 to 300 lbs. working pressure. Maximum length 50'.

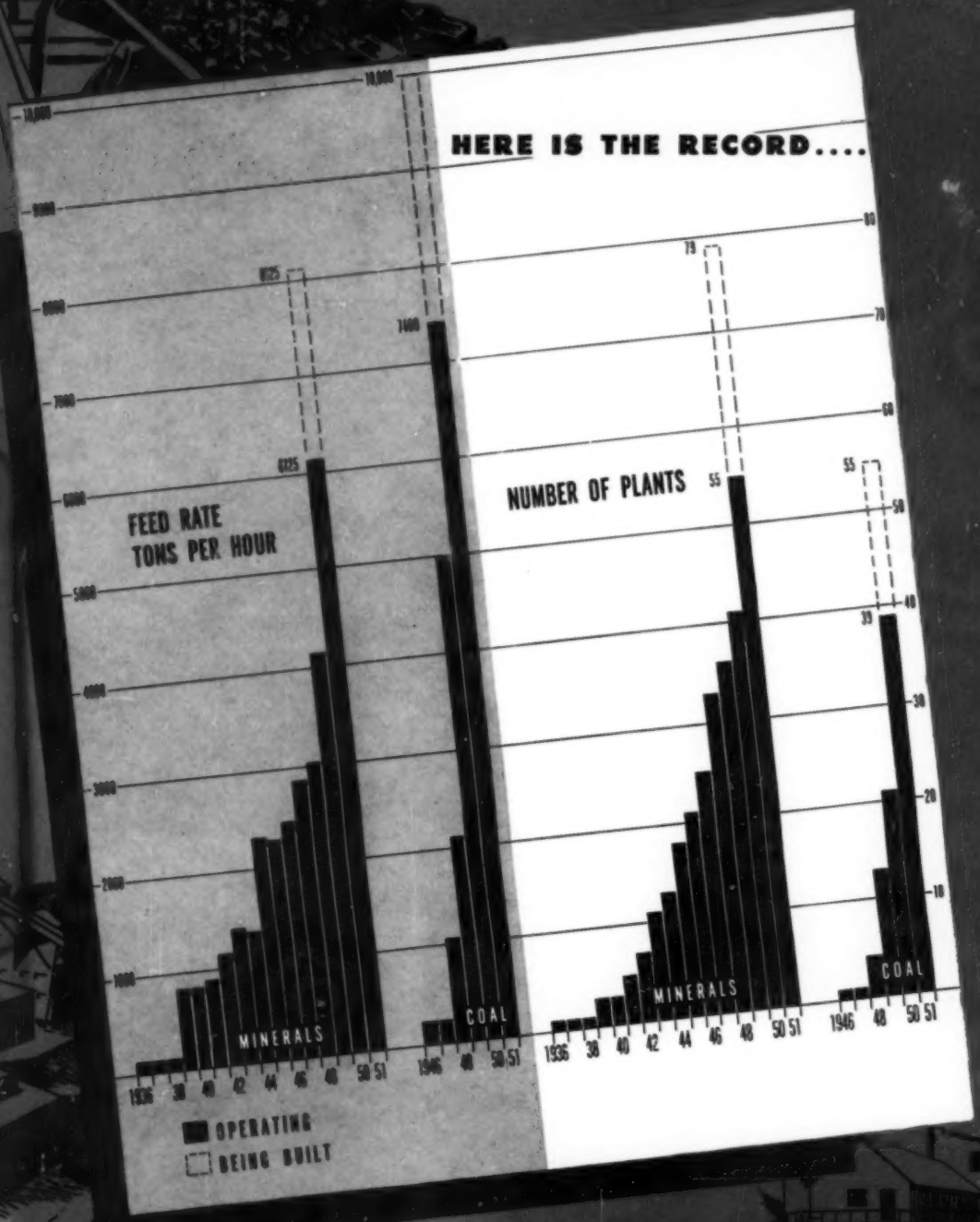
BAY STATE AIR DRILL — For heavy construction work in mines, quarries, tunnels and wherever large size hose is required for long service. Smooth black tube resists heat and oil. Carcass of strong, rubber-impregnated multiple ply woven duck. Rugged, heavy-gauge red rubber cover resists severe weather extremes, cutting, abrasion. 9 sizes stocked from ½" to 4". Working pressures from 150 to 225 lbs. Max. length 50'.

AUROCHS AIR — For portable air compressors, jackhammers, rugged industrial and construction work. Smooth, black, non-porous tube resists heat and oil. Carcass: multiple ply, rubber-impregnated, rugged woven fabric. Tough black cover resists weather and abrasion. Stocked sizes: ½", ¾", 1". 200 lbs. working pressure. Maximum length 50'.

VIM AIR — For general industrial use, on compressors and pneumatic tools. Black tube resists oil and heat. Husky cotton yarn braids. Smooth, red cover resists weather, abrasion. 8 sizes stocked, ¼" 2-braid to 1" 3-braid. Working pressures: 150 to 225 lbs. Maximum length 500'.

BULL DOG VARI-PURPOSE AIR — For a variety of jobs including handling of air, water, oil, gasoline, kerosene (not for paints, lacquers, lacquer-solvents). Black, synthetic tube resists oil and heat. Carcass is braided rayon cord, high strength, super flexible. Smooth, brown, tough synthetic cover resists oil, abrasion, sunlight. 11 sizes stocked from 3/16" one-braid to 1" 2-braid. Working pressures: 200 to 300 lbs. Maximum length approximately 500'.

YEAR-END PROGRESS REPORT



ON HEAVY-MEDIA SEPARATION

....HERE ARE THE REASONS

A year ago, 62 Heavy-Media Separation plants with a combined capacity of 9300 tons per hour had been built.

Today, 134 Heavy-Media Separation plants built and building have a combined capacity of 18,125 tons per hour . . . a 96% overall gain in one short year and a 100% gain in coal cleaning capacity . . . the greatest year's gain in the phenomenal acceptance of Heavy-Media Separation by coal producers.

No other cleaning process ever achieved such rapid acceptance by so many leading operators on so much tonnage from so many seams under such diverse operating conditions. That record is solidly based on these good reasons:

Heavy-Media Separation is the only coal cleaning process that closely duplicates on a commercial scale over a wide size and gravity range, the perfect gravity separations obtained in heavy-liquid tests.

Heavy-Media Separation alone provides unique and exclusive applications of magnetomotive force to provide constant control, conditioning and recovery of the medium. Any process which does not provide this exclusive 4-stage medium control cannot duplicate Heavy-Media Separation results in both grade and recovery of coal and recovery of medium.

Heavy-Media Separation maintains the desired separating gravity within ±0.01 at any gravity from 1.25 to 2.50 . . . can cope efficiently with intermittent feed or sudden increase in the refuse content of the raw coal.

Heavy-Media Separation provides automatic, continuous and complete removal of large and variable amounts of refuse without volumetric limitation.

Heavy-Media Separation recovers more near-gravity coal than any other method, as demonstrated by the profitable installation of Heavy-Media Separation units to recover salable coal from the refuse and middlings of older cleaning processes.

Heavy-Media Separation is no longer new or experimental. Before you decide on any separation method for a new cleaning plant or to supplement your present facilities, it will pay you to inspect an operating Heavy-Media Separation plant . . . to make a comparative study of its better over-all grade and recovery.

As Technical and Sales Representative for Heavy-Media Separation Processes, we can run carload tests on your coal in the Heavy-Media Semi-Commercial Plant at Stamford, Conn. Although we do not design or build plants, we can put you in touch with experienced engineering-construction firms who do, including builders of prefabricated plants with capacities up to 400 tons per hour. We will work closely with your staff or engineers of your choice in the design and initial operation of your Heavy-Media Separation Unit.

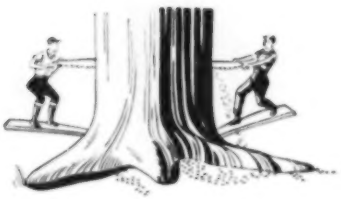
AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

MINERAL DRESSING NOTES #18
"COAL PREPARATION"

This informative 36-page book, clearly and concisely explains the fundamental principles of the Heavy-Media Separation method. With photomicrographs of medium samples from an operating plant, it shows how Heavy-Media Separation employs unique and exclusive applications of magnetomotive force to provide constant control, conditioning and recovery of the medium. It describes typical operating plants, contains test results, flow schemes and other new useful data.



Lumber Company proves Mining Men right

..."it takes a TOUGH Conveyor Belt to haul a tough load!!!"

Mounting labor costs and shortages of local workers caused a large Southern Lumber Company to install conveyor belts for unloading lumber.

The idea worked fine. Several carloads could be unloaded simultaneously on the belts with minimum effort, handling costs were reduced and a confused traffic situation was eased.

But, ordinary conveyor belts couldn't stand the pace! Rough oak planks gouged off sections of belt covers and weather made deep inroads through the cuts, causing carcass deterioration and premature belt failures.

A local Republic Distributor, called in for advice, quickly solved the problem by recommending use of Republic Record Maker—a conveyor belt with tough rubber exterior and a rugged, mildew-resistant carcass . . . a belt widely used in coal and metal mining.

Today, 4 years later, the job's still going smoothly! Raw lumber rolls steadily into the mill on Record Maker Belting. There have been no work stoppages due to belt failures, and company officials claim the operation is now 4 times more efficient than it was when ordinary belts were used.

You'll achieve similar success with Industrial Rubber Products only if the products are properly applied to the job. Take advantage of Republic Rubber's free service offering to have a complete analysis made of your requirements. Write us today. Whether it's Conveyor Belting, Transmission Belting, Hose or Packing—there's no substitute for the best!

INDUSTRIAL RUBBER PRODUCTS BY

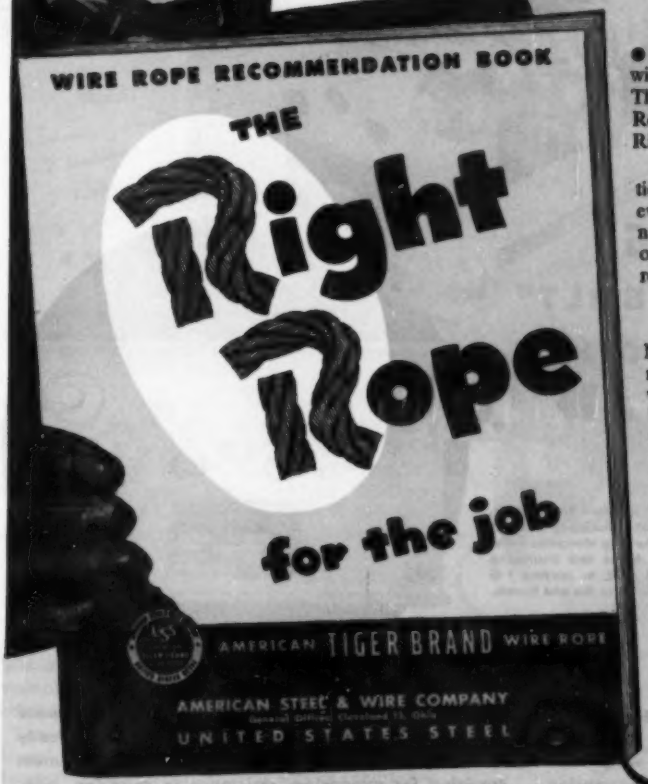
REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

This New Book can save plenty of money for YOU!

IT SHOWS YOU HOW TO BE A BETTER BUYER OF WIRE ROPE



● Here is a book that every user of wire rope should have in his file—The American Tiger Brand Wire Rope Recommendation Book, "The Right Rope for the Job."

It covers all industries—construction, mining, petroleum, marine—even aircraft control cable. There are numerous photographs, plus listings of equipment and the types of wire rope that should be used.

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No WARP... or BUCKLE!

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End view of Standard Resister Unit, with nuts and insulating washers removed, showing elongated holes in the end frame and illustrating the method used to support P-G Resistance Grids in the end frames.

"Floating Bolt" construction, as used in P-G Resistor assembly, provides space to allow the resistance grids to expand under heat. This feature automatically prevents *warp* or *buckle* since the grids are free to move within their maximum limits of expansion . . . Provision for expansion, resistance to corrosion, adequate ventilation, plus steel and mica as basic materials, assure you of longer trouble-free resistor service . . . Try P-G.

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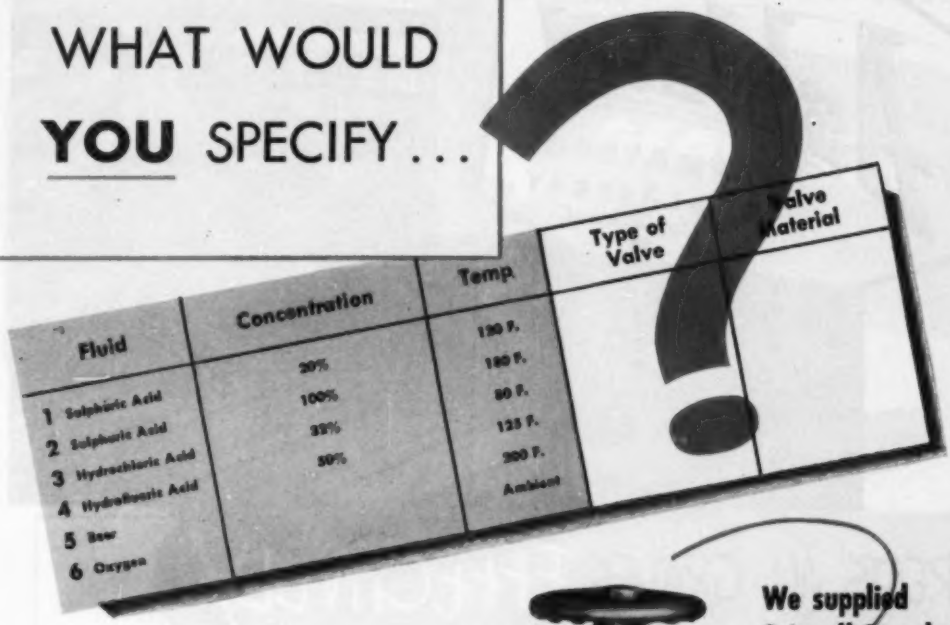

Fluid	Concentration	Temp.	Type of Valve	Valve Material
1 Sulphuric Acid	20%	120 F.		
2 Sulphuric Acid	100%	180 F.		
3 Hydrochloric Acid	33%	80 F.		
4 Hydrofluoric Acid	50%	125 F.		
5 Beer		200 F.		
6 Oxygen		Ambient		

In several of these cases other body materials or diaphragms would serve as well. But the really important fact is the unmatched versatility of Grinnell-Saunders Diaphragm Valves in handling corrosive fluids, gases, compressed air, food and suspended solids . . . in lines where corrosion, abrasion, contamination, clogging, leakage and maintenance are problems.

Grinnell-Saunders Valve bodies are stocked in cast iron, malleable iron, stainless steel, bronze, and aluminum, with other materials available on special order. Valve bodies can be lined with lead, glass, natural rubber or neoprene. Diaphragms are available of natural rubber and a number of synthetics to suit particular service conditions.

The Grinnell-Saunders Valve Division will be pleased to submit recommendations upon receipt of complete information covering service conditions.

We supplied Grinnell-Saunders Diaphragm Valves with . . .

Body Material	Diaphragm Material
1 Rubber lined	Natural rubber
2 Cast iron	KEL-F
3 Glass lined	Butyl
4 Magnesium	KEL-F
5 Polished bronze	White diaphragm
6 Cast iron*	Neoprene

*For oxygen service a high flash point lubricant is supplied. All valves for oxygen service are subjected to 300 lb. air underwater test.

Features of the Grinnell-Saunders Diaphragm Valve

- diaphragm absolutely isolates working parts from fluid
- diaphragm lifts high for streamlined flow in either direction
- diaphragm presses tight for positive closure
- body, lining and diaphragm materials to suit service
- simple maintenance—diaphragm easily replaced

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TREATS ALL GRADES EFFECTIVELY

Ashland engineers have proved conclusively that all grades of bituminous coals can be both dust-proofed and freeze-proofed efficiently and economically with PERMATREAT COAL SPRAY. The proof is at the tipples of hundreds of mines and in sales and distributing offices where there is a growing list of satisfied customers demanding this improved fuel.

The Ashland PERMATREAT method of coal treating is not a hit or miss proposition. Careful study has determined the exact amounts and specifications of the spray oil required for all grades and sizes of coal. Any modern preparation and washing plant can quickly install oil treating facilities and make their complete line of coals a better selling, completely clean fuel.

Ashland sales engineers are available for consultation on problems of installation and improvement of oil treating facilities. Write for complete details on PERMATREAT COAL SPRAY which has done so much to hold old and gain new customers for mines and sales agencies.

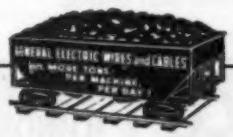
ASHLAND OIL & REFINING COMPANY
Ashland, Kentucky

Reduce Trailing Cable Downtime

From Portal to Face

Let your G-E distributor point the way to smooth operations with these G-E mining cables:

Trailing and Reel Cable
Power Distribution Cable
Lighting Cable
Aerial Cable
Direct-burial Cable
Mine Telephone Cable
Control Cable
Magnet Wire
Shot-firing Cord



Keep your mining operations moving. When toughness really counts—when cable operating continuity means production continuity—specify tough General Electric Geoprene cable.

The jackets on Geoprene cables actually show a tensile strengh far in excess of ASTM standards—tear resistance twice that of natural rubber. That's why G-E Geoprene cables stand long duty—withstand impact and abrasion.

Built for uninterrupted operation under difficult conditions, Geoprene cables have sturdy outer jacket and cushioning inner jacket designed to take real abuse. Cable-laid twine between jackets gives extra strength for extra service.

For a free booklet, *General Electric Wire and Cable for the Mining Industry,* describing G-E Geoprene portable cables and the full line of G-E mine cables, write Section W72-1214, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

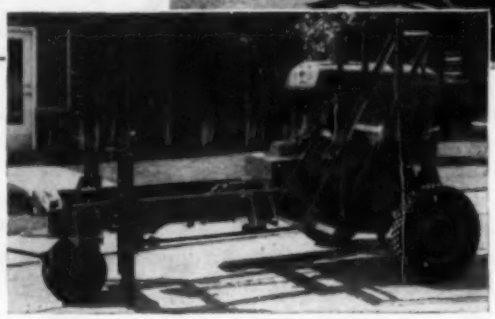
You can put your confidence in—

GENERAL ELECTRIC

PARMANCO HI-SPEED HORIZONTAL DRILL

Completely Re-designed Around a 40 H.P. Engine

Drills a 6-inch Hole in two-thirds the ordinary time



Included in the new design is an auger rack which saves on drilling time. The augers are on the machine as it is moved from hole to hole. Another feature, for faster set up and smoother drilling, is the four individually adjustable leveling jacks. Automotive steering is optional.

This HI-SPEED DRILL is designed for drilling 5-6-8 in. holes to 100 ft. or more. The 40 h.p. engine with four drilling speeds makes possible the reduction of footage time by one third. This new drill, the very latest in design, is equipped with self starter and generator, dual type front wheels, truck type rear axle with hydraulic brakes and traction drive with both forward and reverse. Here is greater speed in retrieving augers and four rotating speeds and reverse for drilling and cleaning the hole. Here is accuracy and mobility. Here is the modern answer to faster, lower-cost drilling.

PARIS MANUFACTURING CO. PARIS ILLINOIS

JOY SULMET BITS

PROVE AGAIN THEY'LL CUT YOUR COSTS

CONDITIONS

Comparative performance of Joy Sulmet Type Sm Bits and two other makes of tungsten carbide bits on a Joy Continuous Miner. Seam about 96" thick—hard firm coal with a 1" or 2" rock parting, normally about 2 ft. from the top. Occasional sulfur intrusions in the coal; in general, fairly hard cutting.

RESULTS

	Joy SM Bits	Bits B	Bits C
Tons mined in test.....	8113	7873	9145
Comparative Bit Cost per ton, including grinding and setting.....	Low	8.8% higher	77.0% higher

The figures above demonstrate once more that Joy Sulmet Bits are best for the Continuous Miner, as well as for cutting machines of all types—a superiority well established in many different mining areas and under widely varying conditions. The exclusive Joy design, with a protective cap over the tungsten carbide insert, results in fewer broken bits and eliminates lost inserts.

Write for Bulletin, or *Consult a Joy Engineer*

W&D CL 9/15

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

What's U. S. Rubber doing in the Cumberland Mts.?

A member of the U. S. Rubber belt engineering staff making one of his regular inspections—an established feature of U. S. Rubber's service.

For the last ten years, a U. S. Rubber Conveyor Belt has been carrying run-of-mine coal from the foot of one of the Cumberland Mountains to a tipple. Millions of tons have been carried by the belt since its installation. Yet this "U.S." belt has many years of service remaining, despite its 10-year performance.

This remarkable success story stems from "U. S." 3-Way Engineering, in which representatives of the mine owners, equipment manufacturers and U. S. Rubber belting engineers coordinate their efforts. Invariably the result is lower cost haulage, increased output. Write to address below.

Overall view of installation with 48" wide, 1000' center-to-center belt in the foreground.

PRODUCT OF

U.S.RUBBER

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

You're assured

NON-STOP LOADER OPERATION . . .
MORE TONS PER MAN-SHIFT

with

LONG PIGGYBACK® CONTINUOUS HAULAGE MINING

WISHBONE PIVOTS—each provides up to 180° pivot-action operation, with the load automatically centered at all times.

***Patented and patents pending*

The portable LONG Piggyback—*the first and only bridge conveyor*—provides the vital link that completes the continuous haulage system from loader to tipple . . . eliminates costly "down-time" waiting for immediate transportation.

Operating as the connecting link between the mobile loader and Room Conveyor, the Piggyback—an exclusive Long development—takes coal out in a continuous, steady stream *as fast as it is produced.* There's no waiting for intermittent transportation. The receiving end of the Piggyback Conveyor is attached directly to the loading machine and follows it automatically as it moves.

In use, the loader-Piggyback-Long Room Conveyor combination operates as a single machine without any attention whatsoever from the operator. Consequently, he can devote his entire time and energy to operation of the loader. He never has to even look back at the rear conveyor discharge. Further, he never has to tram coal on the loader or stop for pan-ups.

Of particular note is the flexibility and extreme maneuverability of the Piggyback. The two "Wishbone" pivots—one at each end of the Piggyback—provide a pivot action of 180° each. This means the load is centered at all times and continuous haulage can be maintained at a 90° angle breakthrough and in close quarters. The dolly action permits long advances without pan-ups.

Available in two models with rated capacities from 2 to 5 tons per minute, the Long Piggyback System offers the first efficient, economical solution to the problem of *true continuous mining!*

Ask for a demonstration—no obligation!

LONG Super Mine Car Co., Inc.
Fayetteville, W. Va. Oak Hill, W. Va.

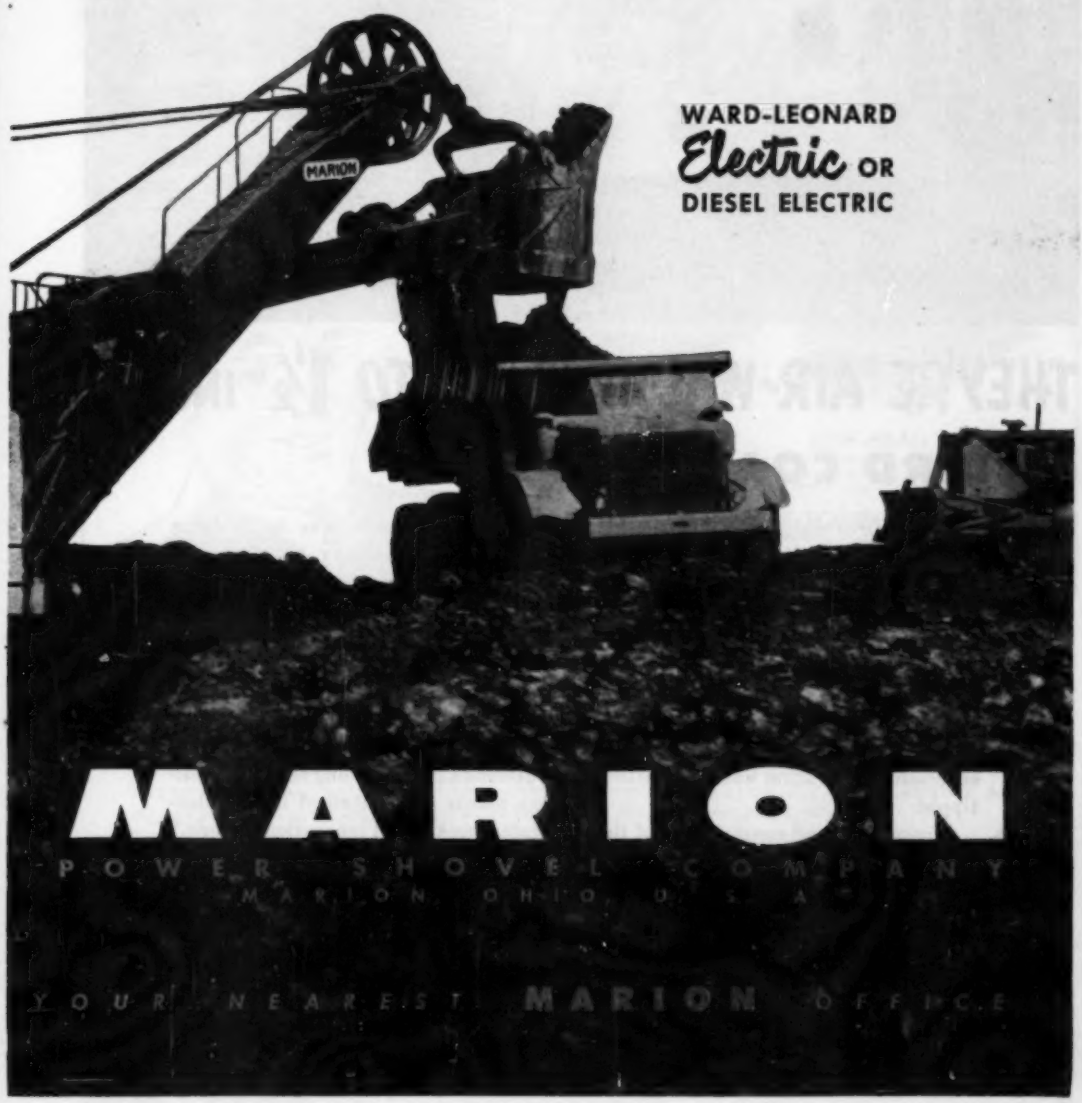
All standard loading machines and continuous miners are adaptable to the Piggyback System

NEW
MARION
191-M
WESTERN
CONTRACTING
CORPORATION

MARION 191-M • 10 cu. yds.

World's Biggest Shovel For

LOADING BIG HAULAGE UNITS



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Electric OR
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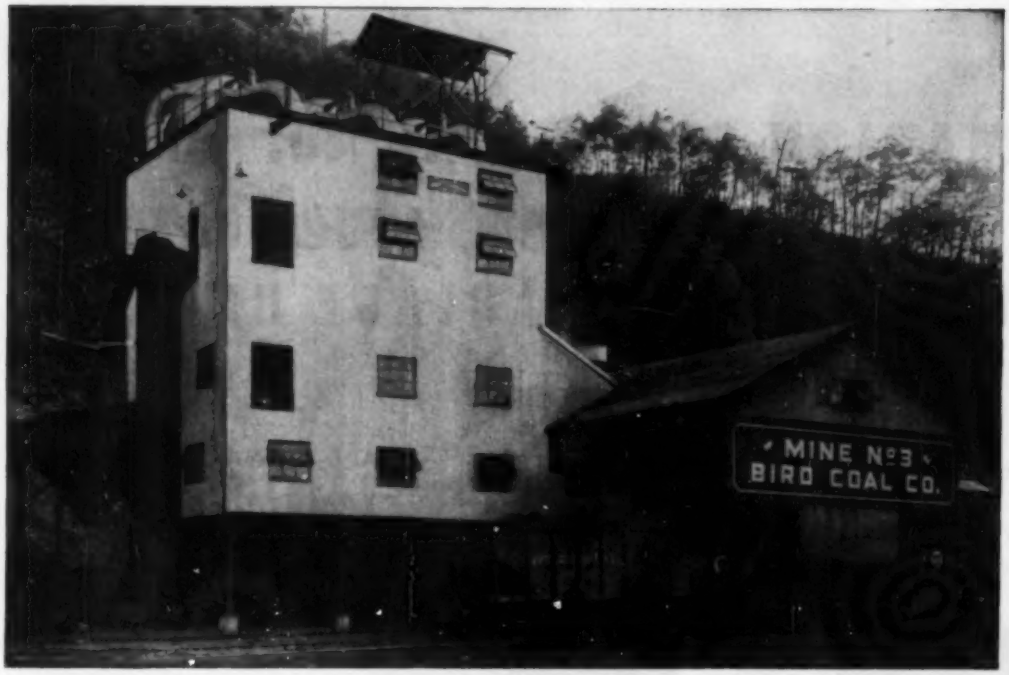
POWER SHOVEL COMPANY
MARION, OHIO, U.S.A.

YOUR NEAREST MARION OFFICE



THEY'RE AIR-WASHING UP TO 1½-INCH AT BIRD COAL COMPANY!

Here's air-washing at its best—this new 150 ton-per-hour plant at Bird Coal Company's Mine No. 3. Outstanding features of the plant are the unusually high washing efficiency of its two R&S Super-Airflows, *even with coal sizes up to 1½-inch;* ash and sulphur reduction suitable for metallurgical use; 100% dust recovery; and successful integration with an existing tipple.

Engineering and construction of the plant as well as the manufacture of the Super-Airflow units was by Roberts and Schaefer Company.

For outstanding results in *your* next preparation plant—whether air-washing, wet-washing or heavy media separation—consult Roberts and Schaefer Company.

Construction, operating and machinery details of a number of other outstanding air-washing and wet-washing plants are contained in the illustrated booklet, "Preparation Parade." Send for your free copy today.

ROBERTS & SCHAEFER COMPANY

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1315 Henry W. Oliver Bldg. PITTSBURGH 22, PA. | P. O. Box 570 HUNTINGTON 10, W. VA. | 254 West 54th Street NEW YORK 19, N.Y.

FOREIGN DEPT.: International Mfg. & Equipment Co., Inc., 230 Broadway, New York 38, N.Y., U.S.A.

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There's an A-C Man Near You!
RIPL-FLO SCREEN
A high capacity inclined vibrating screen with two-bearing mechanism. Low weight, maintenance, power requirement.
LOW-HEAD SCREEN
A horizontal screen for wet or dry screening, rinsing or dewatering. Straightline motion. Saves headroom, space.
AERO-VIBE SCREEN
A sturdy, low cost vibrating screen for sizing, sludge dewatering, draining. Makes separations 1½ in. square to 28 mesh.

ALLIS-CHALMERS district offices offer you the services of experienced vibrating screen engineers. In all mining areas are specialists who have the training and experience to help you get top screening performance and lowest screening costs for your job.

These experts will come into your plant, look over your present equipment, and suggest how your screening can be made a more profitable operation. Their recommendations are unbiased because Allis-Chalmers builds *all* types of vibrating screens . . . for *any* screening application. All Allis-Chalmers screens can be obtained complete with motor, drive and control.

Feel free to call on Allis-Chalmers for real help in solving screening problems. You'll be getting the finest engineering and experience available anywhere. Allis-Chalmers, Milwaukee 1, Wisconsin. 3512

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Pulverators | Vibrating Screens | Jaw Crushers | Grinding Mills | Gyratory Crushers | Kilns, Coolers, Dryers

WITH **VEELOS** THE ADJUSTABLE V-BELT

You Always have the Right Size Belt When You Need It!

When endless v-belts fail and your stockroom does not have the size you need . . . that means loss of time and production. But if you're wise and have Veelos, the adjustable v-belt, in stock, this can't happen to you.

With Veelos, *any size* v-belt can be made up right from a single reel. Just four reels of Veelos in the O, A, B and C widths can replace up to *316* sizes of endless v-belts on any drive in your plant. If your machines call for only one or two widths, you stock only those reels of Veelos and *you always have the right size belt when you need it.*

Veelos has other advantages, too. Replacement time is less (never necessary to remove outboard bearings). Matched sets that stay matched can be made up instantly. You get full, vibrationless, power delivery because belt tension can be held uniform.

***For full production, always*— standardize on Veelos, the adjustable v-belt. Write for your copy of the VEELOS DATA BOOK today.**

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THE LINK
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ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all widths in three types: regular, oil-proof, static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. VEELOS is known as VEELINK outside the United States.

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tough mine power cable?

it's **ANACONDA BUTYL-INSULATED**

High Voltage Cable

No metal armor or lead sheath, yet . . .
There's even greater mechanical and electrical protection in the combination of *neoprene jacket* and *butyl insulation.*
Together they provide:
Unequalled protection from impact, crushing, twisting and abrasion.
Higher dielectric strength.
Greater resistance to moisture, acids, oils, ozone, heat and flame.
Less weight, more flexibility; easier to handle, install, splice and maintain. Lower first and final costs!

ANACONDA Butyl-Insulated High Voltage Cable is the modern cable for any mine—particularly mechanized mines. Anaconda also specializes in the manufacture of shuttle car cable and cable for the new continuous mining machines. Let our mine service specialists show you, or get in touch with your near-by Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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Ask any Blaster what he wants from a shot and he'll tell you "Good Digging." Ask him how he gets it and he may say: "Well, for example, when we were shooting . . ." and go on with a blow-by-blow description of a particular job.

Every job is different except for one thing: **"We hooked up and detonated with Primacord."**

Primacord is the *proved* and *approved* detonating fuse that makes better blasting possible, with less hazard, shorter loading time, better fragmentation. Insensitive to stray currents, it's ideal for large mechanized operations in stripping, quarrying and open pit mining. It detonates the full charge in every hole and hooks up all holes with knots and hitches in a planned sequence that insures *good digging.*

Plain Primacord for shallow holes and surface trunk line use. Weight 1,000 ft. spool 19 lbs.; tensile strength 113 lbs.

Reinforced Primacord for deep holes and resistance to abrasion. Weight 1,000 ft. spool 20 lbs.; tensile strength 160 lbs.

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Ask your explosives supplier, or write direct

THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONNECTICUT
Also Safety Fuse since 1836

Use PRIMACORD®
THE PROVED AND APPROVED DETONATING FUSE

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

DECEMBER, 1951

IVAN A. GIVEN, EDITOR

Real Help

AS TIME GOES ON, the coal-mining industry is picking up more and more support for its contention that it has the assured low-cost source of energy of all types for the future. Latest to come over to the industry's side is Frederic O. Hess, retiring president of the Gas Appliance Manufacturers' Association. Speaking before more than 1,000 delegates to the 33rd annual convention of the American Gas Association, held in St. Louis in October, Mr. Hess challenged the gas industry to "take advantage of the fact that we can make gas from coal, gasoline from coal and oil from coal."

To improve gas service and provide both industrial and domestic consumers with long-range benefits, Mr. Hess proposed large gas-conversion and standby plants at strategic points along the present natural-gas pipeline system and "near our huge coal reserves." Such plants would handle peak seasonal demands and, in the off-peak periods, produce gasoline, oil and chemicals from coal. Like other proposals for coal conversion, this one may not come to pass in the immediate future. However, it is one more straw on the side of action toward initiation of a program that will widen coal's horizons immeasurably. With help like this from the outside, coal can do no less than step up its efforts in the same direction to the utmost.

Vigilance Everywhere

ALTHOUGH OPINION differs as to steel supply in the coming months, the government adheres steadfastly to its position that it probably will not meet even essential demands. Consequently, control officials are taking further hacks at allotments, including cutting the coal-mining supply to a little over 9,000 tons for the first quarter of 1952. This understandably has generated protests, though so far there is no evidence that the government controllers are going to change their stand until there is actual hardship. It is to be hoped that this will not come to pass, but the evidence indicates that in spite of past experience coal operators must be continuously on the alert if production and the defense effort are not to suffer because fuel cannot be produced.

Of direct interest to producers also are actions on steel in other directions. Great pressure is being exerted, for example, to increase steel allocations for natural-gas pipelines in spite of growing doubts as to possible benefits. At the same time, considerable opposition is developing to possible allocations for such new projects as synthetic liquid fuel plants based on coal, and in a few instances it appears that there is opposition even to steel for fuel-burning power plants, while hydro projects are favored. Vigilance in protecting mine requirements therefore should be paralleled by vigilance in protecting allotments to consuming enterprises, particularly those offering major market opportunities as well as major benefits to the country.

Why Not Coal Too?

THE POSTAGE STAMP—humble and utilitarian though it may be—is one of the world's most widely looked at pieces of paper. That has given a number of people a number of ideas for both variety and advertising. The chicken, for example, was honored not long ago, along with many other more glamorous persons, objects, events and industries. The conclusion is that it would be equally logical to dedicate a stamp to coal mining. The industry's services to the Nation warrant it, and quite likely only a modest campaign would be necessary to set the wheels in motion. The benefits to be secured certainly would far outweigh the efforts involved.

Table I—How Many Men a Face Foreman Bosses in Loading-Machine Mines

Mine No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Location	Utah	Pa.	Ohio	W. Ky.	W.Va.	Ill.	Utah	W. Ky.	W.Va.	Ind.	Tenn.	Ill.	E. Ky.
Seam (inches)	108	84	59	48	96	72	84–132	78	100	66	66	90	42
Capacity (tpd)	–500	3,400	5,000	1,200	2,100	5,000	–500	5,500	5,000	2,800	–500	–500	–500
Employees	12	400	500	100	140	450	..	400	400	..	..	..	..
Tons per crew—man-shift	70	15	18-30	24	21	40	65	69	60	50	25	25	15
Crew Size:													
Supervisors	0	½	1	1	1	1	1	1	1	1	1	1	1
Loader men	1	1	2	2	..	2	3	2	2	1	2	2	..
Cutter men	..	1	2	1	..	2	2	2	2	2	2	..	..
Drillers	2	1	2	1	..	2	1	1	1	2	2	5	..
Timbermen	..	1	2	2	..	..	..	3	3	2	1	2	..
Buggymen	2	1	..	2	..	1½	3	2	..	2	2	..	..
Shotfirers	..	1	..	..	..	1	1	1	1	1	..	1	..
Mechanics	1	..	..	..	..	..	1	1	..	..	1	..	..
Motormen	..	..	1	..	..	..	..	..	1	1	..	3	..
Tripriders	..	..	1	..	..	..	..	..	1	1	..	2	..
Trackmen	..	..	2	..	..	..	..	..	2	..	..	5	..
Others	1	1	2	1	..	1½	1	..	..	1	5	..	..
Total	7	7½	9–15	10	11	11	13	13	14	14	16	21	26

For Best Results From Top, Middle and Lower Management . . .

How Many Men per Boss?

The organization patterns of some wide-awake coal companies show . . .

How you can get:

- A streamlined company set-up
- Lighter loads for top officials
- Better shakes for superintendents
- Closer supervision at the face

How you can avoid:

- Vague lines of responsibility
- Gaps in communications
- Upheavals in organization
- Mushrooming overhead

HOW MANY MEN can a good man be responsible for?

Is your company president badgered by detail?

Is your superintendent bogged down with petty demands on his time?

Do your foremen have to plod all over the mine to supervise their crews? Do they have more men than they can manage? Do they have enough to keep them busy?

These are big questions. It's easy to overlook them when coal prospers, as it did in 1947 and 1948. But now, when sky-high wages, soaring costs and fierce competition from other fuels put a premium on efficiency, these questions take on real urgency.

If these questions are bothering you, you're not alone. Other coal men are trying to answer them too.

The trouble is, there aren't any pat answers that will help everybody—including you. That's because your operations are unlike anybody else's. Nobody has the same mining conditions you have, or the same marketing puzzles, or the same equipment to work with, or the same face cycle, or the same personnel. So, to get anywhere in your search for better organization, you've got to have answers that are tailor-made to your own operation. And you'll have to find them.

Even so, the patterns by which some companies guide their operations may be helpful benchmarks for studying your own set-up and streamlining it. And the changes you make might bring longer life to your president, peace of mind and shorter hours to your superintendent, smooth tempers and a better chance to do a good job to your foremen, a friendlier spirit and higher morale to your workers, and a substantial boost in tons per man, with less confusion, worry and lost motion all up and down the line.

To help you along, here's the way a few coal companies, well known for their wide-awake approach to coal mining, their interest in human beings and their streamlined efficiency, have set up their organization:

What Top Executives Do

TAKE A BIG COMPANY that produces from 10,000 to 12,000 tons per day. It's a combined deep and strip operation, with modern machines and modern methods. Call

it, for the present, Company A.

In Company A, only four men report directly to the president: the men in charge of production, sales, finance, and land and surveys.

Dropping down the company's production line, there's a vice president (operations) and general manager. He's directly responsible to the president. Twelve men report to him including, among others, the general superintendent of stripping, the individual deep-mine superintendents, the chief engineer, the superintendent of maintenance, the safety director, the preparation manager and the director of industrial relations. Soon, if the vice president's plans work out, there'll be fewer men reporting to him. That's because he's looking for a general superintendent of deep mines to whom the individual deep-mine superintendents will report.

Company B has a capacity of about 7,000 tpd and operates four deep mines, two in one state and two in another. Five men report straight to the president: the executive assistant to the president plus the chiefs of operations, sales finance and personnel.

Over each pair of mines in Company B there's a manager of mines. These two men, together with the heads of engineering and purchasing, are answerable to the executive assistant to the president. Each manager of mines has five men reporting to him: the superintendents of the two mines under his control and the superintendents of machinery, preparation, and outside labor and property. One of the two manager of mines, in addition, has an assistant who reports to him on preparation, outside maintenance and housing. Mine managers are directly accountable for safety, though safety work is shared all down the line to the working face.

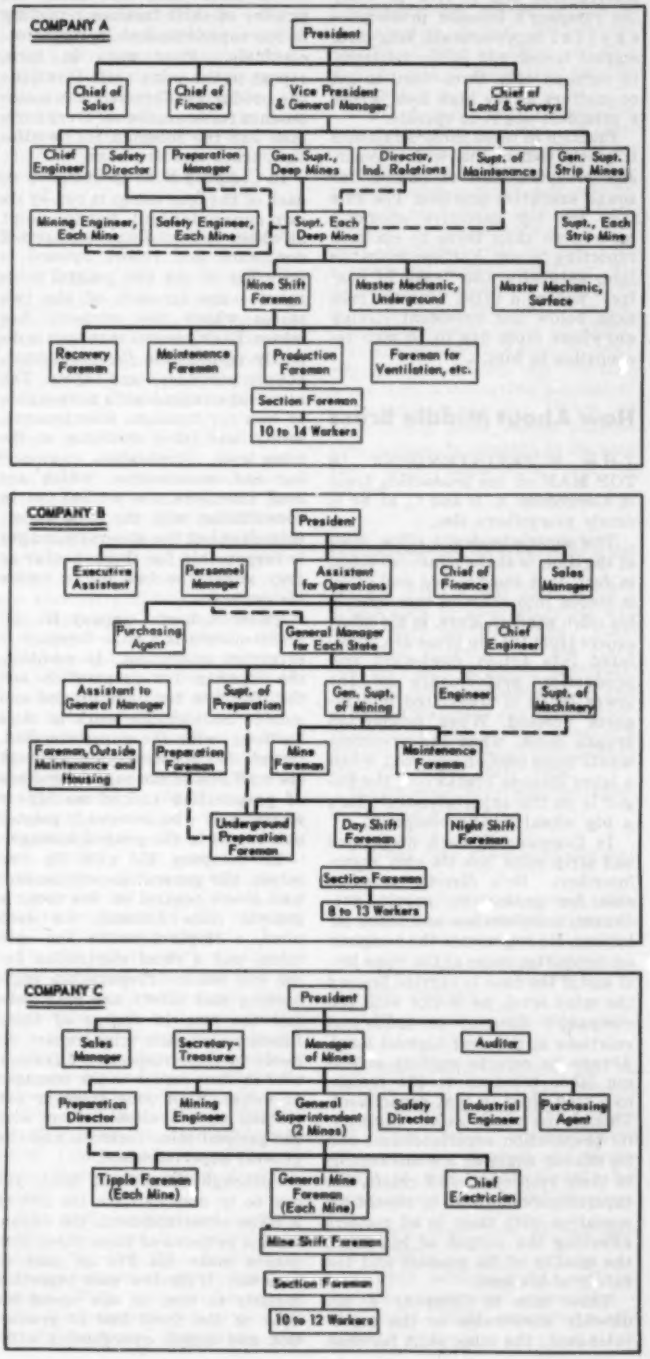
In Company C, which operates two mines with average daily production of 3,500 to 4,000 tons total, only four men report directly to the president: the chiefs of mining and of sales, the secretary-treasurer and the auditor.

Down the production line, next to the president, stands the manager of mines, to whom six men report directly: the general superintendent, the preparation director, the chief engineer, the safety director, the industrial engineer and the purchasing agent.

That's the way three companies operate at the top executive level.

But don't be misled by the fact that only four or five men report

Here's How Three Coal Companies Are Organized for Action on the Production Front



directly to the president. He's anything but idle. But he is shielded from bothersome detail and petty interruption and is free to study the company's broader problems—capital improvements, long-term market trends and public relations, to mention only three—and to act on matters at the high level where a president ought to operate.

Practice in these three companies is pretty well in line with a generally accepted rule of thumb for sound executive practice. The rule says the top executive shouldn't have more than three to six men reporting to him. Further down the line, naturally, the "span of control" widens a little, with the man next below the president having anywhere from five to 10 men responsible to him.

How About Middle Brass

THE SUPERINTENDENT IS TOP MAN on the production front in Companies A, B and C, as he is nearly everywhere else.

The superintendent's office, 99% of the time, is at the mine—so close, in fact, that the finished coal often is loaded into railroad cars outside his office window. Here, in his office, orders from the top brass are translated into action downward and production performance on the lower levels is translated into reports upward. When production breaks down, when the president wants more coal or less coal, when a labor dispute breaks out, the finger is on the superintendent. He's a big wheel in the company.

In Company A, each deep mine and strip mine has its own superintendent. He's directly accountable for production, supply purchases, maintenance and labor relations. He represents the company on committee cases at the mine level and if the case is carried beyond the mine level, he works with the company's director of industrial relations at the next highest level. Always he reports matters affecting labor relations to the company's staff chief in that department. Though the mine's safety engineer, its preparation superintendent and its mining engineer are answerable to their respective staff chiefs, the superintendent works in closest cooperation with them in all matters affecting the output of his mine, the quality of its product and the safety of his men.

Three men in Company A are directly answerable to the superintendent: the mine shift foreman and the two master mechanics, one for underground and another for surface maintenance. If the mine works more than one shift, the number of shift foremen reporting to the superintendent increases accordingly. Four men, in turn, report to the mine shift foreman: the production foreman, the maintenance foreman, the recovery foreman and the foreman for ventilation, track and drainage.

In Company B, as in Company A, each of the four mines is run by its own superintendent. But the point at which operations become action downward and report upward is the office of the two general managers — one in each of the two states where the company has mines. Each general manager is directly responsible for production, supply purchases and safety. The mine superintendent is answerable to him for tonnage, maintenance, safety and labor relations at the mine level. Preparation, engineering and maintenance, which are staff functions, are worked out in consultation with the mine superintendent but the general manager is responsible for them insofar as they affect the two mines under his control.

Under each of Company B's superintendents is a mine foreman to supervise production. In addition, the foreman for preparation and the foremen for underground and outside maintenance work in close harmony with the superintendent, though they are answerable through the staff line to the superintendents of preparation and of machinery respectively who, as already pointed out, report to the general manager.

In Company C, with its two mines, the general superintendent has direct control of five men: a general mine foreman for each mine, a tipple foreman for each mine, and a chief electrician for the two mines. Preparation, engineering and safety are staff jobs and the men in charge of these functions at each mine report directly to their respective directors, who in turn report to the manager of mines. Staff jobs however are worked out in close liaison with the general mine foreman and the general superintendent.

Although there's not much you can do to uncomplicate the life of a mine superintendent, the organization patterns of these three companies make his life as easy as possible. With few men reporting directly to him, he can spend his time on the front line of production and attack emergencies without fear that the whole operation will go to pot while he's away from his desk. With staff men to direct staff jobs, he gets a smooth flow of staff work without giving his time to it directly. His primary job is production. The pattern gives him freedom to deliver it.

Bossing Inside Work

UNDERGROUND WORK MAKES OR BREAKS a coal-mining company. There, by and large, the story of your company's profit or loss is written.

That's why the right amount and right kind of supervision are key factors in your company's strength.

The right kind of working-face supervision isn't hard to define. It's been described in several articles in *Coal Age;* for example, "Being a Better Boss" (June, 1949) and "The Foreman's Role in Labor Relations" (January, 1951), to mention only two. Good foremanship adds up, briefly, to this: it's firm, well-informed, human and on-the-scene. That's the *kind* of foremanship Companies A, B and C and most other coal companies try to provide.

The right *amount* of face supervision is something else again. As stated earlier, you've got to make your own estimate of your supervisory needs. Your final decision will be the result of trial and error and will depend largely upon the kind of equipment you use, the hazards your employees work under, the kind of roof they encounter, the face cycle you adopt, the concentration of working places within an area, and the amount of service work that has to be done, such as timbering, conveyor- or truck-moving, drainage, clean-up work and movement of supplies.

Look again at Companies A, B and C.

All mines of these three companies are fully mechanized, using conventional loading machines. Company A mines seams ranging from 54 to 64 in thick; Company B, seams ranging from 43 to 72 in; Company C, a 40-in seam. Company A uses locomotives and mine cars for haulage; Companies B and C, shuttle cars with locomotives and mine cars. Roof conditions vary from mine to mine.

In Company A, four underground foremen report to the mine shaft foreman—a recovery foreman for salvage of track, timber and other materials; a foreman for track-laying, drainage and ventilation; a maintenance foreman; and a pro-

duction foreman. The production foreman is answerable for tonnage. Eight section bosses report to him.

Each section foreman supervises a 10- to 14-man crew—10 on combination work and 14 on wide work. Combination crews produce upwards of 30 tons per man-day; wide-work crews, a little over 30. A 14-man crew includes the following: two cutting-machine men, a loader operator and helper, motorman, triprider, bugduster operator, two driller-shooters, two roof men and a clean-up man.

In Company B, two shift foremen and a foreman for underground preparation are answerable to the mine foreman. The shift foreman is responsible for 10 section foremen.

Face crews range in size from 8 to 15 men, depending upon conditions and the kind of work being done—whether development or production. Each face crew has its own section foreman.

In Company C, only three production supervisors report directly to the general mine foreman: the day foreman, the night foreman and the third-shift foreman, who serves mostly as watchman. Crews range in size from 10 to 12 men. Each crew has its own boss. With four to six crews working the day shift in each of the company's two mines, there are four to six bosses answerable to the shift foreman.

How Crew Size Varies

FACE-CREW SIZE elsewhere, outside Companies A, B and C, varies with the equipment used and mining conditions encountered.

With loading machines, conventional transportation, and no unusual obstacles to production, crew size elsewhere pretty well follows the pattern of Companies A, B and C. Table I tells the story. It shows that crew size generally runs from 10 to 16 men, including the section foreman. But there are extremes at both ends, ranging from 7 on the low side to 26 on the high side.

In most of the mines shown in Table I, each crew has its own face boss. But in Mine No. 1, a small operation in Utah, there is no real foreman. What supervision there is comes from the mine owner himself. The workers need little or no supervision because a tonnage rate keeps them on their toes. And in Mine No. 2, in western Pennsylvania, there is a face boss for every two 7½-man crews.

In other types of mechanical mining, crew size generally tends to diminish. Using power duckbills and four-man crews in a 38-in seam, a Tennessee company loads 1,600 tpd—25 tons per man-day. Since rooms are advanced 2,000 ft parallel to each other with frequent crosscuts, a section foreman can supervise two or even three crews. In another Tennessee mine in thin coal, four men again make up a duckbill crew. There, a section foreman bosses three crews.

Tightening Supervision

IN MINES using continuous miners, operations still are on an experimental basis and it may be some time yet before optimum crew size is determined. The tendency, however, is toward small crews. For instance, in a big company in Pennsylvania, with continuous miners in seams 45 to 65 in thick, six men make up a crew—the machine operator and his helper, a mechanic, a shuttle-car driver, a surge-bin operator and a boom man on the belt. This outfit produces about 25 tons per man-day. With 10 men working with two continuous miners—output goes up to 30 tons per man-day. One supervisor bosses each crew. Two other Pennsylvania mines using continuous miners, one working a 7-ft seam and the other a 46-in seam, assign four and five men to a crew respectively.

Elsewhere, in Illinois and West Virginia, continuous-miner crews range from three men in a 6-ft seam to five men in a 50-in seam. In Canada, new-type continuous miners are doing longwall mining in a pitching 6-ft seam with six-man crews—two operators, three timbermen and a mechanic. Production currently is 400 tons per 6½ hr of mining per crew.

On the whole, with continuous mining still not firmed down, supervision is exceptionally close. Later, supervision may well spread out a little thinner. Somewhere, though, there'll be a point of diminishing returns—a place, that is, where the money saved by reduced supervision will be more than offset by the drop in efficiency and the increase in accidents. Company officials will have to keep their eyes peeled for that point.

The truth is, increased mechanization in coal mining, while it demands more skillful supervision, makes adequate supervision a little easier. With more machines, and with the transportation, power and supply problems they create, the tendency is to concentrate production into smaller working areas. Likewise, more machines mean fewer men and more tonnage. Thus supervision, like operations, can be concentrated, giving workers the benefits of close guidance and cutting the cost of supervision per ton of output.

Further experiments are pointing in that direction even now. In eastern Kentucky, for example, where a large producer has been experimenting with entirely new mining methods, crew size is being cut back sharply. In one experiment, a five- or six-man crew working only with a universal cutting machine (no drilling or shooting) is mining up to 40 tons per man-shift. In another experiment, using an underground auger in 32-in coal, company officials are setting up two-man crews with a theoretical production of 30 tons per man-day. When the cycle settles down, output may be even higher. It remains to be seen how much supervision will be needed.

Needed—A Watchful Eye

WHEN YOU FIND THE RIGHT ANSWERS to your executive and supervisory problems, brace yourself. The answers that are right this year may be wrong next year.

That's why Companies A, B and C keep a watchful eye on their organization year in and year out, always on the lookout for changes that will speed their work.

Here's what they gain by keeping a close watch:

1. They stay abreast of current needs.

2. By gradual change, they avoid far-reaching and violent reorganizations.

3. They benefit by up-to-date business practice.

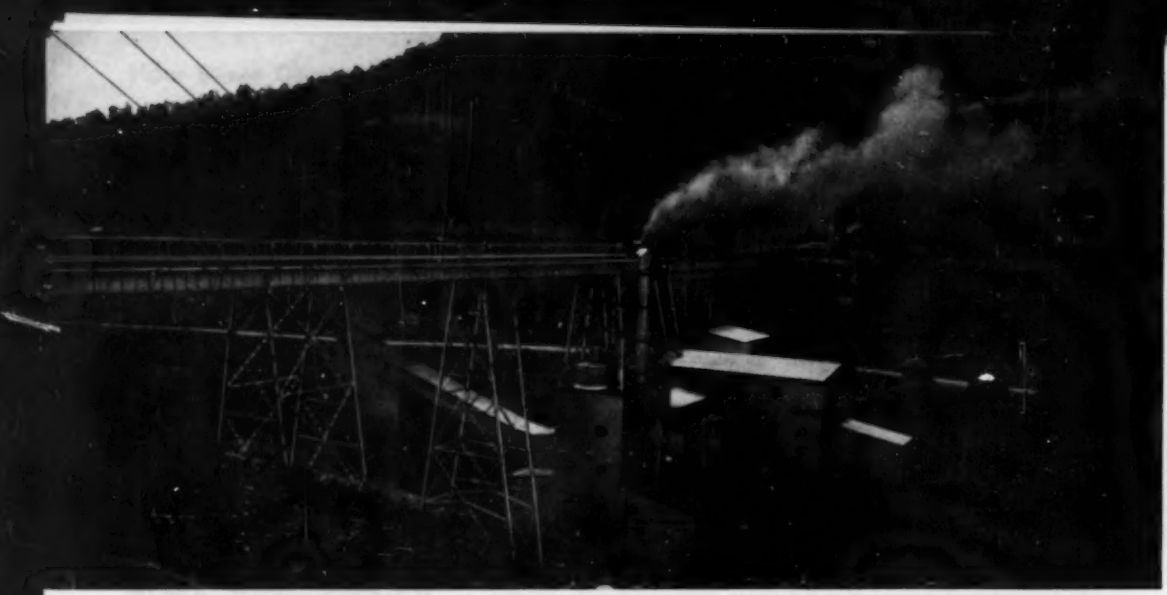
4. They avoid mushrooming overhead.

5. They avoid habit-itis; that is, doing a job a certain way because it's always been done that way.

6. They keep communication channels open upward and downward, as well as horizontally between operating and staff divisions.

7. They keep lines of responsibility clear.

8. They achieve tight, well informed underground supervision—the key to high coal-mining efficiency.



LEATHERWOOD PLANT designed for 700-tph capacity caps some 25 yr of planning and 6 yr of active development by the Blue Diamond Coal Co. The steel trestle connecting the two portals is 126 ft over the railroad and has a 2,500-ton dump hopper.

THE LEATHERWOOD STORY

PART 1—25 years of planning and development for efficient mining and preparation of 150 million tons of high-quality coal

PART 2—Layout, equipment and operation of 5,000-tpd mine determined from "test" setup

PART 3—How new 8,000-tpd preparation plant was designed and built to provide flexible low-cost cleaning of premium coal, after 6 years with temporary facilities

Underwood & Underwood

ALEXANDER BONNYMAN, Blue Diamond president, who sparked Leatherwood.

C. B. JACKSON JR., general manager, in charge of Blue Diamond's 13 mines.

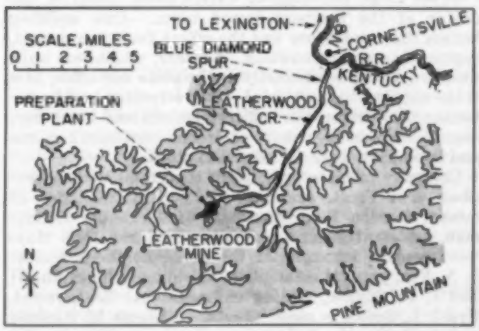
CENTRAL BUILDINGS of native stone are part of an entire community created by Blue Diamond in a wilderness 10 mi from the nearest railroad or highway. Major buildings shown are the store and office (left), supply house and recreation building.

1--Planning and Development

By J. H. EDWARDS, Associate Editor, COAL AGE

COMPLETION of the 700-tph tipple and washing plant of the Blue Diamond Coal Co., Leatherwood, Ky., described in Part III of this article, which during its life will handle close to 150,000,000 tons of coal, emphasized and increased the lead which the company and the Blue Diamond Coal Sales Co. have maintained as producer and seller of premium coals from Kentucky, Tennessee and Virginia.

Alexander Bonnyman, president of the company and a principal stockholder, first became familiar with the Harlan and Hazard coal fields of eastern Kentucky when, as a rodman with the L. & E. Ry.—later a part of the Louisville & Nashville R. R.—he surveyed for branch lines to tap the coal areas. In 1915, after a successful engineering career with several railroads, he organized and financed the Blue Diamond Coal Co. and started Blue Diamond No. 1 mine near Hazard.



LEATHERWOOD MINE AREA of some 26,400 acres comprises about three-quarters of the total Leatherwood seam.

Mr. Bonnyman is a graduate of the University of Kentucky, where in his senior year he substituted as an instructor in mathematics. After leaving the L. & E. he became resident engineer of what is now the Seaboard Air Line, south of Columbia, S. C. His experience with southeastern railroads included a position as chief engineer to extend a part of the Atlantic Coast Line system from Montezuma, Ga., to Atlanta and Birmingham, a job costing about $25,000,000 and requiring erection of over 100 steel structures and bridges. In his 20 yr with railroads, which culminated in the position of general manager of the line through Atlanta, he practiced thrift and was successful with investments in town development, fruit farming and iron-ore enterprises in Georgia and Alabama.

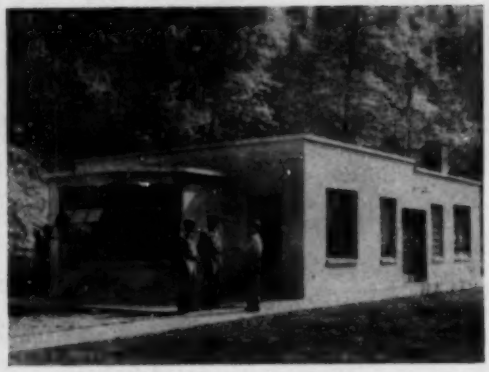
Including Leatherwood mine, the Blue Diamond Coal Co. now operates 13 coal properties, with an investment of approximately $20,000,000 and a total capacity of 7,000,000 tons per year, over half of which is premium coal. In the Leatherwood field, in Perry, Harlan, Leslie and Letcher counties, there is available to the Blue Diamond Coal Co. approximately 26,400 acres—or about three-fourths of the total Leatherwood seam. The seam is 5 ft thick and is without continuous partings. The coal is of hard blocky structure, high in volatile and low in ash and sulphur.

MINE AND TOWN BUILT FROM WILDERNESS

Development of the Leatherwood property began in July, 1944, when it was a wilderness 10 mi from highways and railroads. Mr. Bonnyman, with two associates and a mountain guide, had explored the area in 1918-19, and at that time he began the planning which

THE LEATHERWOOD STORY: 1—Planning and Development

MINE BUILDING near the plant includes the tipple foreman's office, coal-analysis laboratory, bathhouse that can accommodate 500 men, and lamphouse.



MINE FOREMAN'S OFFICE at track level adjacent to one main portal incorporates a dispatcher's annex (left) offering a view of the entire trestle spanning the hollow.

REPAIR SHOP with modern tools and 10-ton crane can handle all mine repairs. A winding shop is in a wing at the right.

RECREATION BUILDING houses lunch bar (above), a theater, post office, beauty and barber shops, poolroom and meeting rooms.

extended over 25 yr and resulted in the L. & N. building a 10.3-mi spur track up Leatherwood Creek and Clover Fork from its main line at Dent, 17 mi from Hazard.

On Jan. 9, 1945, Leatherwood shipped its first car of coal by rail, loaded at a temporary wooden chute. The next step was a $100,000 grading project, which included changing the creek bed and preparing level ground for the tracks, final plant and buildings.

TEMPORARY OPERATION PROVES MARKET

To handle production while the final plant was being planned, designed and built, a temporary but complete steel tipple with screening facilities was erected in 1946. That tipple, moved from the company's worked-out Bonny Blue mine in Virginia (*Coal Age*, February, 1946), screened and loaded 4,200 tons of coal per day until it was torn down in 1950, after completion of the present and final tipple and washing plant.

Operation of the mine for several years with temporary equipment, during which time the underground work was confined principally to development, proved the market's ready acceptance of the coal. It also served to provide information on seam characteristics and analysis, which left little guesswork in designing the ultimate plant to suit the conditions.

A railroad track between the retail store and supply house serves the unloading platforms of both. The company clubhouse overlooks the town center and is within easy walking distance. Houses for officials and miners are widely spaced along roads carved in the adjacent hillsides. Since 1945, the Blue Diamond company has built 323 houses at Leatherwood.

EXTENSIVE COMMUNITY FACILITIES PROVIDED

Three large buildings of native stone comprise the center of the company-owned town. One building houses the retail store and the offices for management, engineering and accounting. Another, which was built first and served temporarily as the store and office, now is the supply house. A third—the recreation building—houses the theater, post office, fountain and lunch bar, beauty shop, barber shop, poolroom, conference rooms and two apartments for official visitors.

Company officials principally concerned with operations are: C. B. Jackson, Jr., general manager of mines; Gordon Bonnyman, son of Alexander Bonnyman, assistant general manager of mines; John Mayhew, general manager of the seven northern mines; S. A. Fox, general manager of the six southern mines; and J. D. Snyder, mining engineer. At Leathewood, Frank L. Smith is superintendent; Joseph M. Richard and A. J. Hensley, assistant superintendents; Stanley C. Goodwin, general mine foreman; Ballard Taylor, chief electrician; J. D. Wender, preparation foreman.

DOUBLE-TRACK DUMPING from drop-bottom cars into the 2,500-ton storage bin built into bridge requires only slowing of the trip as it passes. The 2-compartment bin makes delays at the tipple practically non-existent.

THE LEATHERWOOD STORY
2--Mechanical Mining

Currently producing 5,000 tons daily, mostly from development, Leatherwood works both track and trackless mining units for maximum efficiency as conditions dictate, with drop-bottom mine cars and track haulage from all sections

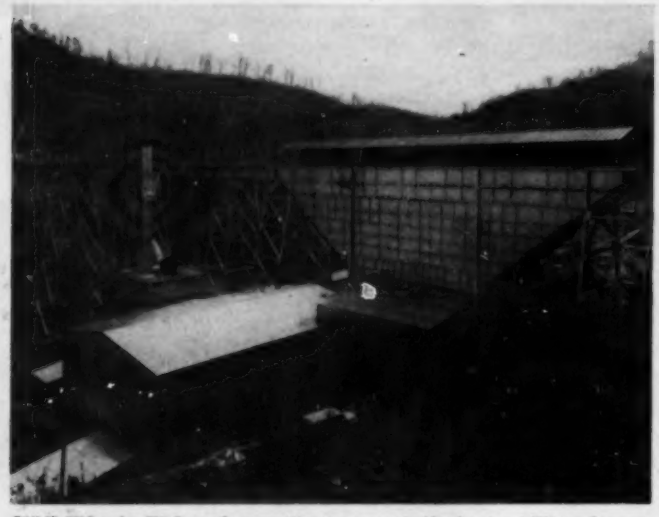
AT ITS LEATHERWOOD MINE the Blue Diamond Coal Co. has available 26,400 acres of the Leatherwood seam—a coal of premium quality. The long-term planning involved in acquiring the property, getting the railroad built and designing the 700-tph preparation plant ties in with the caution that has been exercised in developing the mine and selecting equipment.

Ever since the first coal was loaded by temporary chute in 1945, the problem at Leatherwood has been to get production, while developing as far as possible to expose mining conditions and learn the type of equipment best suited to the job. The mine now is producing 5,000 tons of cleaned coal per day, practically all from development work. As shown on the following pages, both track and off-track equipment are being used, thus providing flexibility for shifting equipment to suit local conditions.

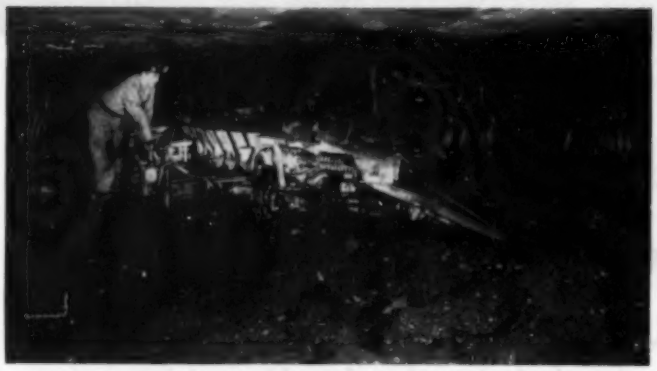
TRACK HAULAGE SELECTED

Because of the irregular shape of the Leatherwood acreage and the long distances involved, track haulage was selected. Long and favorable experience with drop-bottom cars at other Blue Diamond mines influenced their selection for Leatherwood. With double-tracked hoppers over the 2,500-ton dump bin, delays at the tipple are practically non-existent, and dumping requires only a slowing of the trip as it crosses the 750-ft-long 126-ft-high trestle, or bridge. Working in an annex to the mine office, the dispatcher has a view of portals on the two sides of the valley and of the entire bridge.

As shown in the accompanying table, seven sections of the mine are



DUMP BIN under 750-ft trestle connecting two mountainsides has two 1,250 ton hoppers, one for each track. Mainline track is 60-lb rail with wood ties.



BOLTS SUPPORT ROOF in this trackless section. Generally, wood posts, with crossbars in a few places, are the rule, though roof bolting is being used some.

SEVEN TRACKLESS MINING SECTIONS include five using these tractor-tread loaders. Three sections operate with track-mounted equipment.

Operating Highlights Leatherwood Mine

Seam Characteristics

Thickness from 50 to 70 in, averaging 54 in; practically level with a few local rolls; seam 1,250 ft above sea level and 126 ft above railroad at plant; coal, hard and blocky, with partings but not continuous.

Roof and Floor Conditions

Roof generally excellent; half of roof opened to date, reliable sandstone; the remainder, strong slate; bottom, fairly firm fireclay that softens badly when wet.

Roof Control

Generally wood posts, with crossbars in a few places; in some sections, split-and-wedge steel roof bolts installed, with roof drilling by Cleveland stopers supplied by Acme portable air compressors.

Face Preparation

Coal breaking, partly with permissible powder and partly with Airdox; drilling in two sections with Joy CD22 hydraulic mobile drills, with conventional hand-held electric drills in others; all places undercut.

Haulage

Track haulage with 530 new Sanford-Day "1-2-3 Automatic" drop-bottom mine cars, of which 140 are 12 ft long and 390 are 16 ft carrying 6 tons; gage, 48 in; 60-lb mainline on wood ties; 25-car mainline trips pulled by Jeffrey 13- and 15-ton locomotives; gathering in track sections by Jeffrey 8-ton cable-reel units.

Mining Methods

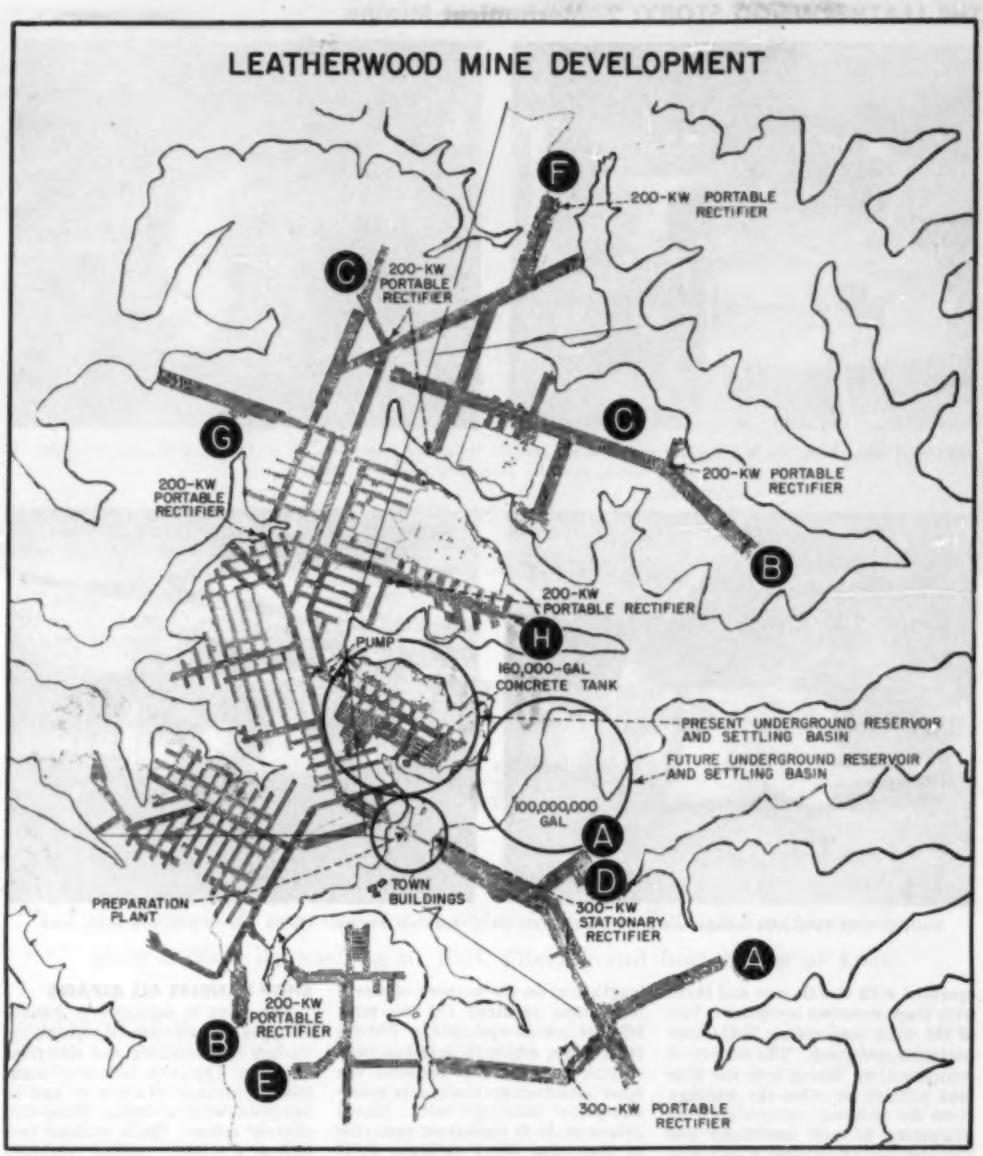
Mainly development so far; main entries driven with five or six headings, 14 ft wide on 60-ft centers; for retreat work in a few sections to date, room-and-pillar with rooms 20 ft wide on 80-ft centers.

Power

250 v DC supplied through six 200-kw and two 300-kw General Electric rectifier substations, all portable except one 300-kw unit near preparation plant; five substations are underground, three outside at crop openings.

Mining Equipment

Seven sections use shuttle cars and three employ track-mounted equipment, shown on the mine map opposite.



Section Equipment in Use at Leatherwood

A—Two Sections:

1 Goodman 660 loader
2 Joy 6SC shuttle cars, 3¼-ton
1 Joy 11RU cutter
1 Joy CD-22 mobile drill

B—Two Sections:

1 Goodman 360 loader
1 Jeffrey 29J cutter
Bethlehem prefabricated track

C—Two Sections:

1 Goodman 660 loader
2 Joy 6SC shuttle cars, 3¼-ton
1 Joy 11RU cutter

D—One Section:

1 Joy 14BU loader
2 Joy 32E shuttle cars, 3-ton
1 Joy 11RU cutter
1 Joy CD-22 mobile drill

E—One Section:

1 Goodman 360 loader
1 Jeffrey 29L cutter

F—One Section:

1 Goodman 660 loader
2 Joy 6SC shuttle cars, 3¼-ton
1 Jeffrey 29LC cutter

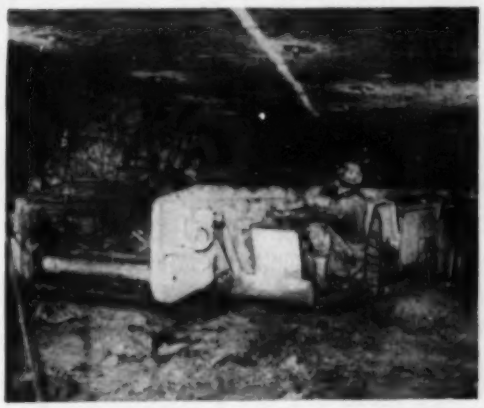
G—One Section:

1 Goodman 660 loader
2 Jeffrey shuttle cars, 3¾-ton
1 Jeffrey 29LC cutter

H—One Section:

1 Joy 14BU loader
1 Jeffrey 29L cutter

UNDERCUTTING, shown here in a trackless section, is the practice throughout Leatherwood mine. Coal is broken by air (right) in some sections and with permissible powder in others.



SHUTTLE-CAR HAULAGE includes use of 10 3¼-ton units (left) and four new-type 3¾-ton cars (right) now being tried.

operated with shuttle cars and three with track-mounted equipment. Two of the track sections use Bethlehem prefabricated track. The variety of equipment, all fitting into the general picture of mine-car haulage from the sections, permits shifting equipment to suit conditions and provides the experience which may finally lead to a standardization of the major items of underground machinery. At present, continuous-mining machines are not being considered because of their inability to produce lump coal. At the loading points where shuttle cars discharge to mine cars, loop tracks are installed and trips are pulled through by spotting hoists, thus avoiding trip-changing delays.

WORKING PLACES VARY

Main entries are driven with five or six headings, depending on their length and on the number of working places required for the most efficient use of equipment. For retreat work, which to date has been carried on in a few sections, the most satisfactory method is room-and-pillar mining, with rooms driven on 80-ft centers on each side of the room entry to leave 60-ft blocks of coal to be taken on retreat.

The bathhouse, located at railroad-track level where it is convenient to the two portals and the preparation plant, has shower and clothes-hanger facilities that can accommodate 500 men. The cap lamps (M.S.A.) are issued from a room in this same building. Attached to the end of the main building toward the preparation plant is a lower structure which houses the coal-testing laboratory and the office of the preparation-plant foreman.

SHOP HANDLES ALL REPAIRS

The mine is equipped to handle all types of maintenance repairs, including car repairing and electrical winding. The shop, located at seam level, measures 65 x 200 ft and is equipped with a 10-ton Shaw-Box electric crane. Tools include two lathes, a shaper, milling machine, radial drill, hydraulic press, metal-cutting band saw and power hammer. For baking rewound or repaired armatures, a caster-mounted oven is used (*Coal Age*, August, 1951). The oven, heated by infrared lamps, is in two halves which close around the armatures while it hangs vertically over the dipping tank. In mining, tungsten-carbide bits have been used extensively, but are being displaced because of shortages and cost by plain bits which are sharpened at the mine and then faced with hard material.

LEATHERWOOD PLANT looking toward the empty-track side. The 2,500-ton dump hopper receiving coal from drop-bottom cars is divided lengthwise into two bins, one for each of the two tracks on the 126-ft-high trestle.

THE LEATHERWOOD STORY
3--Coal Preparation

Designed to handle up to 30% reject in preparing a top-quality product with a wide range of size combinations, new 700-tph Leatherwood plant utilizes jig washing of 8x0, filtering and heat-drying of fines

SOME 25 YR OF PLANNING before any coal was mined, and 6 yr of development and operation with temporary equipment, preceded construction of the permanent 700-tph Leatherwood plant of the Blue Diamond Coal Co., Leatherwood, Ky., designed for a potential capacity of 8,000 tons of cleaned coal per day. The company spared no money in building this plant to achieve a low operating cost and to do a washing, screening and preparation job worthy of the premium all-purpose commercial and domestic coal it ships from the Leatherwood seam.

While the seam includes no continuous partings, it does have come-and-go partings which make a cleaning plant a necessity—a plant that must be able to handle coal carrying as much as 30% reject. After extensive study by Blue Diamond officials and many tests on samples, including carload lots to a test plant at Harvey, Ill., the Roberts & Schaefer Co., operator of the test plant, was commissioned to design and erect a complete 700-tph plant at Leatherwood. In brief the new plant washes 8x0-in coal in a Jeffrey Baum jig, dewaters the fines with Bird filters, heat dries with a Raymond flash drier and employs air tumblers to prevent drier dust from entering the atmosphere.

TWO MINES SUPPLY COAL

A double-tracked steel trestle or bridge, 126 ft high and 750 ft long, connecting the two main-haulage portals on opposite sides of the valley, has a 2,500-ton hopper to receive coal from drop-bottom mine cars. The hopper is partitioned into two 1,250-ton bins, one under each track. From each bin, a Jeffrey Traylor vibrating feeder moves the coal to a mixing point feeding onto a set of Parrish-type shakers, including a scalping section with 8-in-round holes, which are followed by a picking table and other Parrish-type screens for classifying washed 8x2-in and crushed lump.

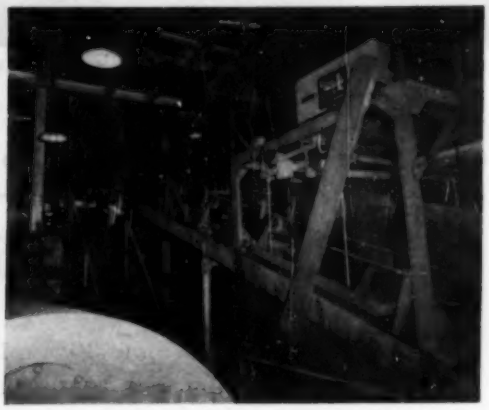
Another source of feed to the main shaker is a belt conveyor from a railroad hopper receiving 5x0-in "mill-in-transit" coal from the company's Leatherwood No. 2 mine, a smaller operation located in a side hollow down the creek. Unloading is done with a Robins car shaker driven by a 10-hp motor.

On the picking table, rock is

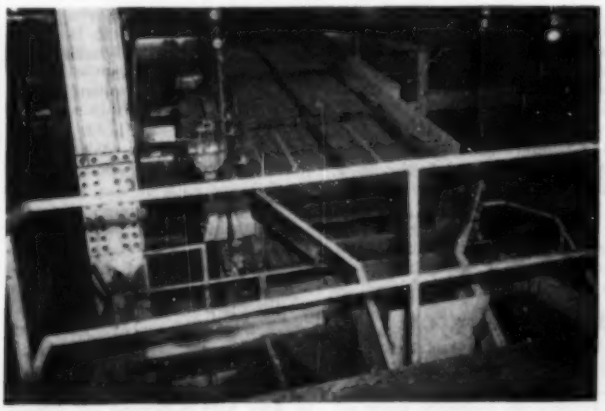
THE LEATHERWOOD STORY: 3—Coal Preparation

COAL FROM THE DUMP HOPPER goes to this 8-in scalping screen and picking table from which pieces of rock are raked into a center hopper feeding to a 30x54-in rock crusher (right) for disposal via belt conveyors.

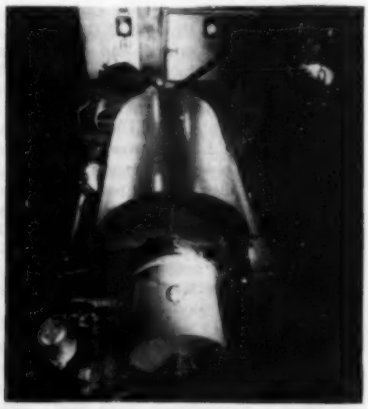
PLUS 8-IN COAL from the scalping screen, which includes blocks up to 3 ft or so, is reduced to 8 in by this crusher.



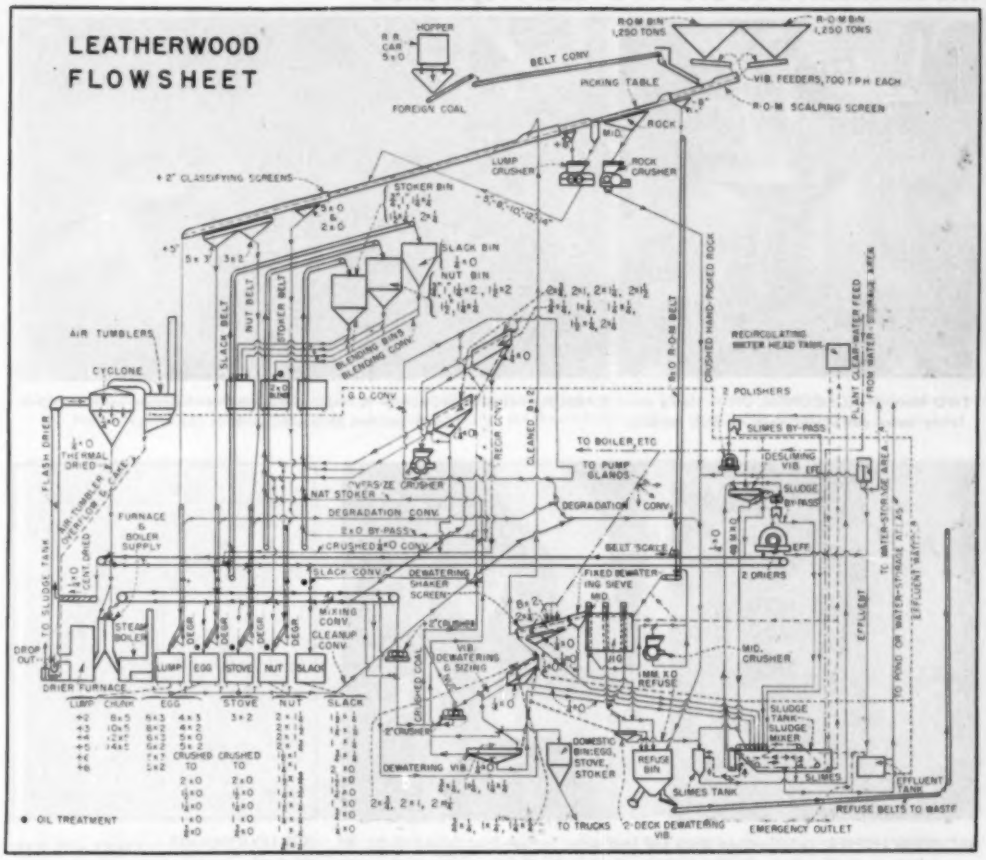
BELT-CONVEYOR SCALE (right) weighs the 8x0 R-O-M as it is elevated to the washing jig.



VIBRATING SCREEN, one of two high-speed units for dewatering minus 2-in wash coming from the main shaker classifying screens.



ONE OF THE TWO horizontal mechanical driers that dewater the ¼-in x 48-mesh washed fines.



pushed through a hole in the center and falls into a McLanahan & Stone 30x54-in Rockmaster crusher, which reduces it to 8 in for disposal by belt conveyors.

Both coal and rock often include very large blocks. The lump coal, with chunks up to 3 ft, may be loaded direct or diverted through a McNally Pittsburg breaker for reduction to the 10- to 14-in range, which is classified on the Parrish screens in line with the main shakers.

An elevating belt conveyor equipped with a Fairbanks-Morse belt scale with selsyn-operated remote tonnage register and a 40x60-in Dings magnetic pulley feeds the 8x0 from the main shakers to the 3-compartment 8-cell Jeffrey Baum jig having 168 ft of screen area. Middlings from the jig are crushed in a Jeffrey Flextooth crusher and returned to the washing circuit. From a Parrish-type dewatering screen, the washed 8x2 moves to the main shaker classifying screens, while the 2x¼ is further dewatered on two high-speed vibrating screens (one a 5x14-ft double-deck Ty-Rock and the other a 6x14-ft Low Head) and the minus ¼ is sluiced to a sludge tank.

NUMEROUS SIZES POSSIBLE

By utilizing the Jeffrey 24x30-in Flextooth oversize crusher, two McLanahan & Stone 42x24-in double-roll primary and secondary crushers, four vibrating screens, three blending bins and several conveyors, numerous size combinations can be prepared for shipment. The stoker, nut and slack blending bins each hold 75 tons. With the Jeffrey Traylor vibrating feeders adjustable in infinite steps, the flow from each bin can be regulated to produce mixtures of 2-in nut-and-slack in any proportion.

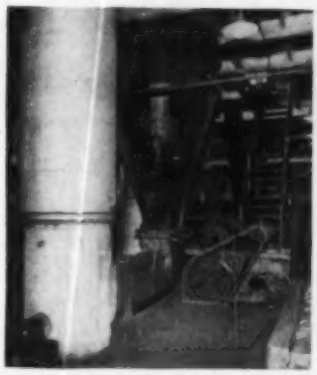
Minus ¼-in coal scraped from the sludge tank is moved by a Hazleton 5-in pump to an Allis-Chalmers Low-Head desliming vibrator with 48-mesh screen. Underflow returns to the slimes pump or sludge tank, while the remainder goes to two 54x70-in Bird filters. Effluent from the filters flows to a tank, from which some is pumped to the air tumblers and dewatering vibrators, and the remainder is permitted to overflow into the sludge tank.

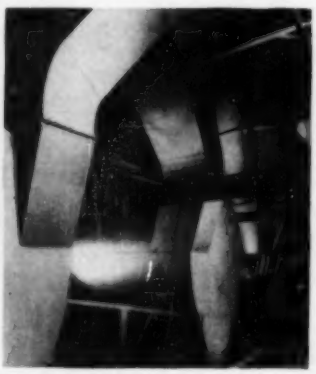
Mechanically dried coal from the Bird filters is heat-dried in a Raymond flash drier heated by a furnace equipped with a Combination Engineering stoker. The drier is rated at 75 tph of finished ¼x0 product from an initial 10% moisture down to 2%. Hot gases from the cyclone collector exhausted to the atmosphere pass through two Type W No. 20 air tumblers made by the Dust Suppression Engineering Co., connected in parallel and rated at 20,000 cfm each. In these, gases are forced through a helical path of horizontal axis and encoun-

THE LEATHERWOOD STORY: 3—Coal Preparation

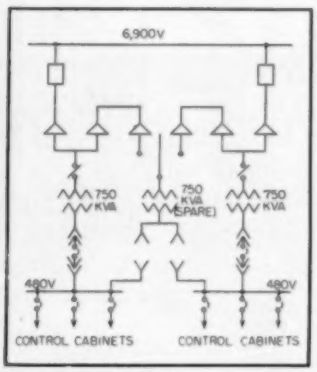
TWO 40x60-IN HORIZONTAL UNITS clarify circulating water containing minus 48-mesh material.

CARBON, NUT AND STOKER go to blending bins via three neoprene belts, one 30 in (right) and two 24 in wide on 30-in idlers.





RECEIVING HOPPER, variable-speed drive and feed screw to flash-drier column (left). At right, air tumbler dust collectors (front) and air lock and bottom of cyclone.



ONE TRANSFORMER is a spare using draw-out breaker taken from unit cut out.

ter the water surface at the bottom of each turn. Centrifugal force throws the particles out in contact with the water or against the wetted sides.

Sludge from the tumblers and any drying-column drop out is pumped to the sludge tank. Dried ¼x0 from the cyclone above the Raymond unit moves on the bottom strand of the slack conveyor to the mixing conveyor or to the slack track.

Much of the very fine coal and refuse particles and some of the suspended clay are purged from the circulating system by two 40x60-in Bird polishers fed from manifolds along the sides of the sludge tank supplemented by underflow from the desliming screen and jig dewatering screen. Material removed by the polishers goes to the refuse conveyor, while the effluent is re-used or is pumped by a Morris Type CS 30-hp centrifugal to an underground settling and storage area (see mine map, p 79).

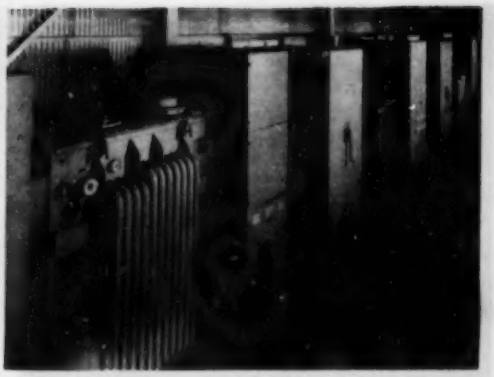
Prepared coals are loaded on five tracks, four of which are equipped with loading booms. All sizes smaller than 5-in can be hot-oil sprayed by a Viking system to allay dust. The spray is "Permatreat" furnished by the Ashland Oil & Refining Co.

2,500-FT CONVEYOR FOR REFUSE

Refuse is deposited in a valley across the hill from the plant. Belt conveyors, 30-in wide with a 300-tph maximum capacity, elevate the material 482 ft from the plant bin to the top of the hill, from which it is disposed of by truck or bulldozer. This conveyor system, in four sections, totals 2,500 ft. Both the sectionalized framework (in 10-ft sections) and the belt were supplied by Hewitt-Robins, Inc. Along stretches where the framework is within 8 ft of the ground the supports, at 10-ft intervals, are single concrete posts which were precast with anchor bolts and then set in the holes and grouted (see page 106 of this issue).

The underground reservoir, which serves both to eliminate suspended material in the washing circuit and to conserve water for dry periods, consists of more than 100 acres of worked-out mine area near the plant. Twelve underground dams make it possible to impound 40,000-000 gal. An underground pumping station consisting of two Fairbanks, Morse 500-gpm units pumps the clarified water to a 160,000-gal concrete tank supplying the make-up water to the washing plant. A 4-in steel line carries the water to the tank and a 6-in Transite line conducts tank overflow back to the reservoir.

Anticipating the time when sediment will greatly reduce the reservoir capacity, a larger one to hold at least 100,000,000 gal is planned for a mine area in the opposite hill, also near the plant. Reduction



MAIN CONTROL ROOM includes (left) rig for magnetic pulley, four capacitors and the 2,300-v control center and (right) cabinet with 440-v breakers and starters for plant's main motors. One of the three 650-kva 3-phase transformers (right photo) is a spare.

LARGEST MOTOR in the plant is this 200-hp 885-rpm unit driving a fan for the flash-drying equipment shown in more detail in right photo. The motor is one of three 2,300-v units in the plant. All others are 440-v.

in the quantity of solids going into the reservoir, thus prolonging its useful life, is a valuable service of the Bird polishers.

The plant's principal pumps are installed in duplicate. There are two Allis-Chalmers 4,500-gpm units handling circulating water to the Jeffrey Baum jig and two Hazleton (Barrett Haentjens) pumps delivering the ¼x0 coal slurry to the Bird filters. The latter pumps are 5-in Type CT rated at 840 gpm, including the slurry handled at the rate of 90 tph, and are of Ni-Hard construction.

Other pumps include three Allis-Chalmers pumps handling Bird effluent; a Morris unit returning effluent to the underground reservoir; two Yoemans units, one a flash-drier sump pump and the other in the oil-spray system sump; a Fairbanks, Morse pump in the sample-grinding room sump; and an Aurora condensate pump.

Farval centralized lubrication systems are used on the R-O-M shaker drive and on the lower washed-coal screen drive. The first has a hand-operated pump while the second is equipped with a power-driven automatic pump. Oil flows by gravity from an oil house on a truck road on a side hill near the plant to lubricate the plant conveyors of chain and flight types.

Falk "Speedreducers" and "Motoreducers" are used on at least 30 plant drives. Flight and scraper conveyors are built with "Keystone Rivetless Chain" made by the Wilmot Engineering Co. Floor gratings are the welded type made by the Standard Steel Grating Co. Plant roofing and siding are corrugated aluminum.

DESIGN REDUCES MOTOR LOAD

Ninety electric motors totaling 2,443 connected horsepower drive the plant and the water-supply pumps. Many additional motors would have been necessary were it not for the use of drop-bottom cars and the dump hopper built into the trestle to provide gravity feed to the main shakers. Fractional horsepower motors are not included in this total.

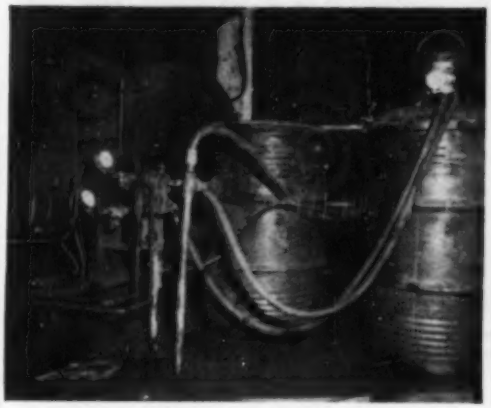
Practically all motors are Westinghouse and all except the larger units, are of the Westinghouse "Life-Line" design. All motors are operated at 440 v, except the three largest, which are 150 and 200 hp. Motors are totally enclosed, except for the two driving reservoir pumps and the four powering belts on the hillside refuse-disposal system.

The transformer substation, or load center, reducing from 7,200 v to 440 v, is an Allis-Chalmers indoor-type installation consisting of three 750-kva 3-phase Chlorextol-filled transformers, one of which serves as a spare. To put the spare in service, a draw-out breaker is taken from one of the other transformers and placed in the proper

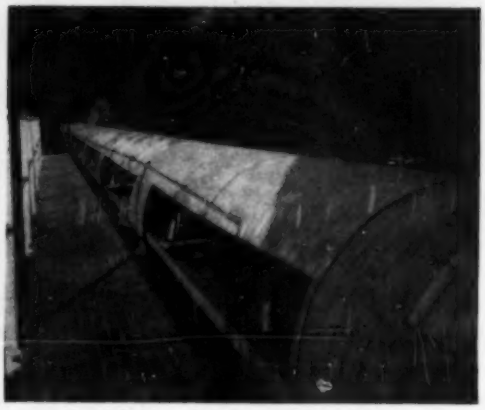
THE LEATHERWOOD STORY: 3—Coal Preparation

POLISHER EFFLUENT is pumped to the underground reservoir by a 200-gpm pump driven by a 30-hp 1,750-rpm motor.

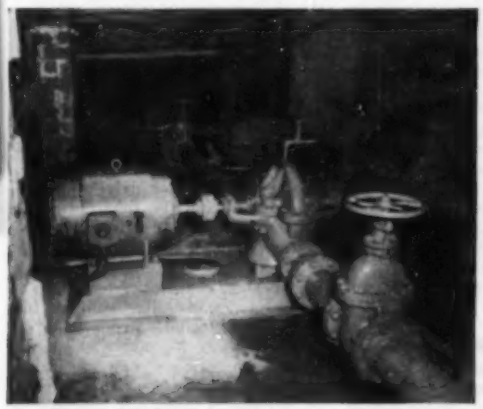
DRIVE for each of the four loading booms consists of a 7½-hp motor, gear reducer and roller chain.



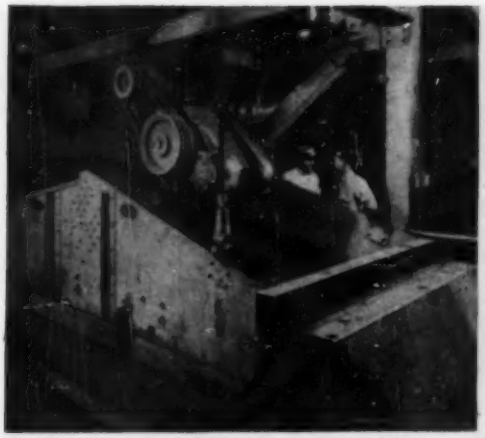
AUTOMATIC LUBRICATION of the lower washed-coal screen is obtained through a central system with a power-driven pump.



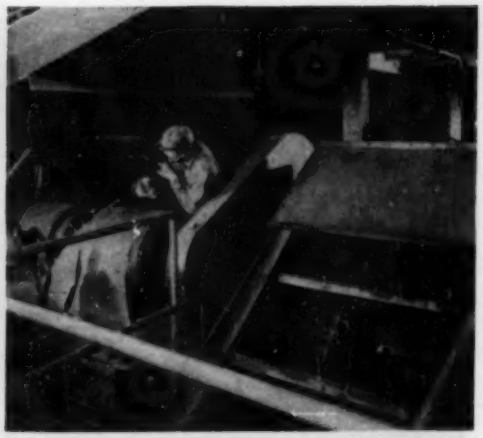
REFUSE is carried up 482 ft to the top of the hill by a four-section 30-in belt conveyor system 2,500 ft long.



FROM THE UNDERGROUND RESERVOIR, two 500-gpm units pump water to a high tank. Pumps for moving the ¼x0 slurry to the horizontal centrifugal driers (right) are installed in duplicate, one of which is a spare.



SLUDGE DESLIMING SCREEN removes 48-mm0 from the feed to the horizontal centrifugal driers.



GEAR REDUCER connecting the 30-hp motor to chain drive of wet-coal mixing conveyor receives a special lubricant.

compartment. The load-center unit is in the main plant, on a floor directly above the control room.

EXTENSIVE CONTROLS UTILIZED

Practically all controls were furnished by General Electric. The control room contains, in addition to the central Cabinetrol starter group, four GE 440-v 120-kva capacitors, a 2,300-v GE "Limitamp" control center, including a line starter for the 200-hp motor driving a 60,000-cfm fan for the flash drier, and two wound-rotor primary controls for the 150-hp motors driving the Bird driers.

The Cabinetrol contains circuit-breaker across-the-line starters for 440-v motors up to and including 50 hp and circuit-breaker reduced-voltage starters for the 440-v motors larger than 50 hp. Smaller Cabinetrols are located in the boom operator's cab and in the furnace room. The pushbutton board—a vertical G.E. unit controlling the principal motors in the plant—is on the jig floor.

Coal dust is kept out of the control room by an American Blower Corp. air-conditioning unit which filters the incoming air and maintains a positive pressure in the room at all times.

Power for lighting is supplied through an Allis-Chalmers 112½-kva Chlorextol-filled transformer on the same floor as the main power center. Six 400-w mercury-arc lamps illuminate the picking-table. Space lighting is provided by some 400 Benjamin 100- and 150-w vapor-tight fixtures.

Foundations for the plant presented quite a problem since part of the area consisted of fill of 35 ft maximum depth made 6 yr previously and containing boulders which precluded driving piles. Shallow-spread footings with unit pressures proportioned to the full depth were used and show no appreciable settlement after 2 yr.

To erect the trestle and parts of the plant, a high line was strung 2,500 ft from mountainside to mountainside, on which a traveler was operated by a double-drum steam hoisting engine. Plate girders 70 ft long were set in place by lifting one end with the high-line traveler and the other with a small stiff-led derrick traveling on the trestle. For the most part, erection of the plant proper was handled by two guy derricks with 115-ft booms set on the valley floor.

Electric Motors

Horsepower	Number in Use	Make
200	1	Westinghouse
150	2	Westinghouse
100	3	Westinghouse
75	7	Westinghouse
50	1	Westinghouse
40	11	9 Westinghouse, 2 Fairbanks, Morse
30	6	Westinghouse
20	5	4 Westinghouse, 1 Crocker-Wheeler
15	3	Westinghouse
10	12	11 Westinghouse, 1 Reliance
7½	7	6 Westinghouse, 1 L. J. Wing
5	23	18 Westinghouse, 5 General Electric
3	3	1 Westinghouse, 1 Con. Electric, 1 Louis-Allis
2	2	1 Westinghouse, 1 Jeffrey
1½	1	Louis-Allis
1	3	2 Westinghouse, 1 Louis-Allis

PLANT WORKS THREE SHIFTS

Leatherwood plant operates three shifts and to date the maximum output per day has been 7,300 tons of clean coal. Of that, 5,500 tons was mined in Leatherwood mine and 1,800 tons shipped in from Leatherwood No. 2. The following typical analysis indicates the quality of coal shipped: plus 5-in block, 3.75% ash and 0.55% sulphur; egg, 3.76 and 0.57; dedusted slack through 2-in round, 4.32 and 0.63. A plant specification for turning out ¼-inx-48-mesh carbon of not over 7% ash has been met by a wide margin.

Outlets for ¼-inx48-mesh carbon are diversified. A variety of special-purpose sizes and blends produced in the minus 2-in sizes include domestic and commercial stoker coals, straight 2-in, 1½-in and 1¼-in nut and slack and, in addition, some unusual blends tailored to the needs of individual steam plants. Slack moves principally to the lakes and the steam and premium domestic to the northern markets.

The Leatherwood coal is successfully taking the place of the Darby, High Splint and Jellico coals, all of which the Blue Diamond Coal Co. mines, though in insufficient quantities at times to meet the demand.

COATING RESULTS in a manway. The timber was removed and loose rock to a height of 7 ft was taken down and coating applied. No falls have occurred since and cleaning up and retimbering have been eliminated.

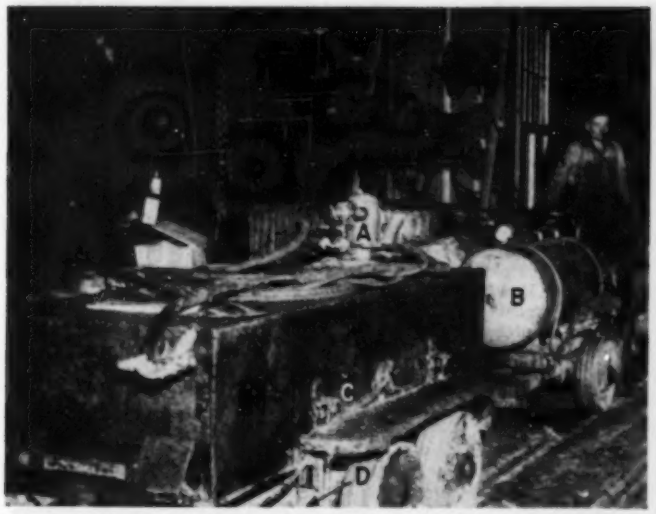
Coating for Roof Protection

Here's how one mining organization plagued by roof falls resulting from moisture and temperature effects developed low-cost protection through application of an asphalt-base coating. The cost at one mine is now only 1% of the former cost of cleaning up and retimbering.

By ANTHONY SHACIKOSKI
Superintendent, Leechburg Mining Co., Bowman Coal Co. and Park Coal Co., Leechburg, Pa.

COATING APPLICATION to area previously dusted with portland cement. Note cement clinging to roof. The heated coating material is applied with an air-operated gun.

COATING ONCE-OVER—J. D. Mitchell (left), Joseph Woodwell Co.; Wilson Shelkoski, assistant foreman; Adam Petrosky, mine foreman; and James Forney, coater. Note scraper used to trim top.



COATING-UNIT DESIGN: *A*, pump inserted in tank; *B*, air compressor; *C*, heated jacket around the square tank; *D*, wood block to keep car truck insulated.

PAINT with the required characteristics can provide real protection against falls of roof as a result of changes in atmospheric conditions. At Foster No. 5 mine, at Edman, Pa., as an example, the cost of painting now is only 1% of the former cost of loading out rock and retimbering haulage roads, airways and other openings affected by air slacking and temperature changes.

Naturally, as implied in the preceding, painting is not needed for all types of top. Careful examination and observation of action at various periods of the year are the best guides. If, for example, the roof does not scale or fall during the summer months, and if it does not absorb moisture, it doesn't need painting. But if, as at Foster No. 5, operating in the Lower Kittanning seam, heavy scaling is encountered in the summer months, painting may well be the answer.

THE NO. 5 PROBLEM

At No. 5 mine during the summer months, and especially when the humidity was high, rock falling on the haulage roads would average 80 to 90 tons a week. Timbering, as well as taking down and handling rock, also was necessary in this period, usually extending from June 20 to Oct. 20.

Warm, humid air would attack the roof for a distance of 6,000 ft in from any intake portal. In places, the roof would fall out as high as 18 ft around the timbers, leaving them standing. In some places also, where 10x10 sets were placed with 3-in plank lagging, the weight of rock falling on the lagging was so great that it actually broke the sets down. All this took place on the intake, while the return aircourses remained good.

During the winter months, after all the loose rock had been taken down, the roof would stay in good condition. On June 20 the trouble would start again. Though it was felt that the character of the roof was the determining factor, there was still a question. Consequently, the fan was reversed and haulage was put on the return as a test during the month of July. No rock fell on the haulage road, but falls began in the aircourses. Rock falls in the airways were more costly to clean up than those occurring in the haulage openings.

Application of an air-blown sand-cement mixture was considered as a remedy, but since it was wet it was concluded that the moisture would induce additional scaling and cause the coating to come off.

ROCK COMPOSITION STUDIED

As a first step to remedial action, the rock was carefully studied and was found to be a formation of sulphur, lime, a little carbon, sand and shale. It contained numerous limestone nodules and flakes, as indicated in Fig. 1.

These large and small formation particles do not react until subjected to moisture and changes in temperature. However, moisture carried into the mine by the intake air in the summer, which is high in humidity, is absorbed by the sulphur-bearing strata. The result is a chemical reaction and the transformation of the moisture into a sulphuric-acid solution. The action of the acid causes the limestone deposits to expand within the strata. Consequently, the rock chips off. As it penetrates deeper and deeper, this chemical reaction breaks loose pieces of rock from a few ounces to several hundred pounds in size, as shown in Fig. 2.

The reaction is the same as water freezing in crevices and pipes. Ages back, for example, our ancestors broke rock in quarries by drilling

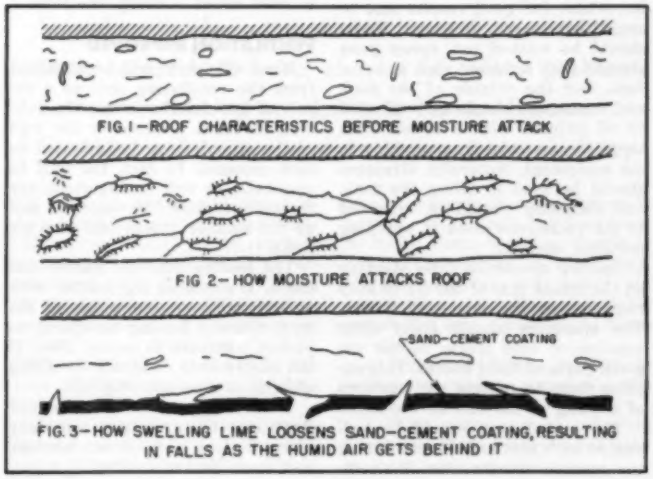


FIG. 1—ROOF CHARACTERISTICS BEFORE MOISTURE ATTACK

FIG 2—HOW MOISTURE ATTACKS ROOF

FIG. 3—HOW SWELLING LIME LOOSENS SAND-CEMENT COATING, RESULTING IN FALLS AS THE HUMID AIR GETS BEHIND IT

holes, plugging them with dry pine, pouring water over the plugs, and permitting them to swell overnight.

If iron pyrites is present in the rock formation, the sulphuric acid will attack these also and cause roof breakage. Temperature changes also have a definite effect upon the roof, as different rocks expand and contract at different rates, breaking away from the solid mass. This also is true with sand-cement mixtures, as shown in Fig. 3.

COATING MATERIALS

After investigation of the problem it was decided to try painting. Consequently, an asphalt-base paint was employed starting in 1942. Its use was continued through to 1949. During this period we had some failures in certain spots. The reason was that this particular paint was not heavy enough for areas where there were cracks and crevices. Presence of the cracks permitted moisture to get under the paint and penetrate the rock, with resultant scaling and falling.

To overcome this, portland cement was applied by means of a rock-duster to the wet roof and sides as soon as moisture collected on the painted area. This cementing was done several times during the summer months with good results.

In a search for better results, we looked for a heavier-base coating and decided to apply it with an undercoating machine. Among those consulted was J. D. Mitchell, of the Joseph Woodwell Co., Pittsburgh, Pa., who recommended "Rufkote," a special coating material developed by the company for mine roofs and mine stoppings. Through Lincoln, we obtained a gun that would apply the coating. It is the same type of gun used in undercoating automobiles. Rufkote is heavier than the paint previously used and closes up the cracks and crevices better.

WHEN TO COAT

Coating must be done when the roof is dry. The roof should be scaled and all loose particles or rock taken down before coating. Also, all dust should be removed from the areas to be coated. Since painting must not be done when the roof is wet, moist dust may present a problem. We solved it by using a high-pressure rockduster to spray the wet areas with dry portland cement. This cement hardened on the rock, saving the labor of sweeping off the dust.

The coating material will not adhere, as indicated, to wet areas or areas that are covered with dust either dry or wet. Coating should be done during November to May for best results. Coating will not hold up loose rock. Its function is to seal the roof and rock sides to exclude humid warm air, thus preventing deterioration and preserving the coated area.

COATING METHODS

Rufkote is a black asphaltic-base material which must be heated for application. However, the Joseph Woodwell organization has developed an improved roof coating which does not require heating, under the trade name Ruflok.

Where heating is necessary a large tank with heating elements in jackets is preferred, such as, particularly, hot water outside the tank kept warm by electric heating units. This keeps the Rufkote at a consistency which facilitates free application. When exposed to the air, however, it hardens quickly, sealing the area to which it is applied.

Rufkote is removed from the tank and applied by a pump, air compressor and spray gun. All barrels of material are kept in a well-heated building. The service tanks holds 120 gal of coating material, or enough for an 8-hr shift. To protect trolley wires, a section of 1-in hose is cut on one side so that it can be slipped over them. The hose also protects the men.

TWO MEN DO SPRAYING

Two men will apply from 100 to 120 gal of Rufkote in an 8-hr shift, and also clean up the equipment ready for the next shift. This is important for good results and to avoid equipment failures. Hoses should be washed out, spray guns cleaned with a solvent such as kerosene, and the outside of the tank and equipment should be well oiled or oil painted with a brush. This keeps the material from sticking to the equipment. Naturally, strainers should be used in filling the tank, and cleansing should be extended to the rockduster used in applying portland cement.

Coating should be done starting on the intake side of the air to keep men out of the mist and fumes. The operators should apply clear vaseline or cold cream to the exposed parts of their bodies. This enables them to remove any spatters of coating at the end of the shift.

The coated area should be well dusted with portland cement during the summer months when the coated area is wet. The cement hardens over the coating to make an enamel-like seal, which also renders the application fireproof. Several applications should be made over the coated areas, and these areas should be carefully checked during the summer months and places where scaling has occurred should be repaired the next winter.

COATING RESULTS

The cost of roof coating depends upon the equipment employed and the quantity of scaling necessary. Good tools, such as scrapers, sharp picks, slate bars and roof scalers, will reduce the cost. First application is the most costly, since all the roof must be scaled and coated.

Coating at our mines now costs us about 1% of the expenditures previously necessary to keep rock loaded out and openings properly timbered. In 1942, coating cost us 9c per square foot, which included the cost of trimming, application, coating material and equipment. Existing conditions have a great bearing on the cost, but about 16c per square foot will cover the job today.

In conclusion, the results are improved if new coats are applied each winter and portland cement blown on each summer for several years. The heavy seal along the headings makes for safer haulage and reduces the hazards to persons using these openings. Wrecks are avoided, along with the delays encountered in falls on the haulage roads. Mine fires are prevented, as there is less danger of trolley wires being pulled down by rock falls. Haulage is speeded up and more tons are moved since men are not worried about running into falls.

VENTILATION IMPROVED

More efficiency will be obtained from the ventilating unit as a result of less friction along the rubbing surfaces. Leaks over the tops of the stoppings are eliminated in each crosscut. In fact, the roof in crosscuts, as well as the stoppings themselves, should be coated to seal up the smaller cracks and stop air leaks.

The coating does not harden and crack. It stretches like rubber with an expansion or contraction of the roof, thereby leaving no cracks to permit moisture to enter. Also, if the coated area is struck by flying objects, it does not chip off.

We are happy with the results of Rufkoting in our mines, especially when we look back at our haulage roof cost before coating.

COOPERATION AT THE FACE, backed up by sincere cooperation at the policy levels, helps Anthracite improve its safety record.

Steady improvement in anthracite's record proves that . . .

Teamwork Makes Mining Safer

Management, labor and government pull together in an engineered safety drive featuring:

Sound methods to counteract hazardous conditions

Basic research to keep abreast of safety problems

Extensive training to eliminate human failures

Constant safety pressure to prevent complacency

IN THE DRIVE toward fewer injuries and fatalities, the anthracite industry is making sound methods and cooperation pay off at an accelerating rate. This is evidenced by the fact that the 1950 preliminary rate of 2.072 fatalities per million tons is 68% less than the 1930 rate of 6.399, as shown by Bureau of Mines figures in Tables I and II.

The irreducible minimum in anthracite, according to the Pennsylvania Department of Mines, is 0.16 fatalities per million man-hours. It is yet to be reached, but the record in recent years indicates that it is not an impossibility. As in the past, further progress will reflect intensification of the industry's search for better answers to these questions:

1. What conditions, peculiar to anthracite mining, complicate the safety issue?
2. What steps can be taken to counteract these adverse conditions in the interest of safety?
3. How is an "engineered" safety program developed?
4. What are today's problems?
5. What are today's most promising solutions?

1 Conditions Complicate Safety Engineering

Safetywise, anthracite differs somewhat from other types of mining as a result of the natural occurrence of the veins and the extensive voids created by more than a century of mining.

At many mines where veins are steeply pitching, "advancing" means moving straight up into the coal. As a daily routine, men and supervisors who work these veins climb ladders as much as 250 ft high, holding their supplies under one arm.

Multiseam mining is the rule at most properties, one colliery having 13 open veins. Since rock intervals between many of the veins are

20-Yr Perspective Shows How Anthracite Grows Wiser in the Ways of Safer Mining

Table I—Anthracite Fatalities in 1930, 1940 and 1950

	Fatalities per million tons			Fatalities per million man-hr		
Year	Deep	Strip	Total	Deep	Strip	Total
1930	6.127	2.052†	6.399*	2.029	1.664†	1.758*
1940	4.144	0.814	3.574	1.900	0.819	1.503
1950	1.73	0.14	2.072	.....‡	.....‡	0.745

Table II—Anthracite Lost-Time Injuries in 1930, 1940, 1950

	Injuries per million tons			Injuries per million man-hr		
Year	Deep	Strip	Total	Deep	Strip	Total
1930	392.743	60.793†	414.557*	130.086	49.299†	113.898*
1940	289.877	23.432	267.666	132.943	23.588	112.555
1950	.....‡	.....‡	199.473	.....‡	.....‡	71.718

* Includes fatalities at surface works.
† Includes fatalities at washery and dredge operations.
‡ Not available.

small, roof-control and prevention of squeezes become major problems.

Also, multiseam mining makes necessary the annual development of miles of rock openings, thus raising the siliceous-dust hazard and requiring the daily use of large quantities of high explosives.

Thin veins, less than 3 ft, have been opened in some fields as thicker veins approach exhaustion. The possibility of moving rapidly to avoid danger is limited and supply-handling is difficult in these veins.

Off-the-solid shooting is necessary in many places because the character and lay of certain veins prohibits machine cutting.

Impounded water in underground reservoirs is a hazard to life and property if such reservoirs are inadvertently tapped, and extensive old workings may harbor dangerous accumulations of gas. These are some of the major differences.

In addition, there are the inherent hazards of rope haulage on many underground slopes and planes, the roof problems that arise as a result of second, third and even fourth mining, and the accident possibilities involved in hoisting men in deep shafts.

Anthracite stripping, too, is somewhat different. Overburden usually is deep and hard, and highwall blasts resemble quarry blasts in magnitude and effect. The handling and use of large quantities of high explosives is a safety problem. And the safe employment of numerous large machines is another.

2 Safe Methods Meet Adverse Conditions

From experience, much of it gained the hard way, the anthracite industry has developed techniques that minimize the natural hazards.

In steeply pitching veins, wherever the system is practicable, there is a trend toward recovering coal from slant chutes rather than from breasts driven on the full pitch of the vein. Gangways and airways nowadays are most often driven through the bottom rock of the vein to provide more stable openings. Thus, ladder hazards and roof-fall dangers have been reduced. The search for safer methods of pitch mining continues, and new tools and machines are being applied with intelligent engineering in efforts to "keep the men out of the coal."

Similarly, other hazards of anthracite mining have been sought out and countered. To reduce the possibility of squeezes and detrimental roof action in multiseam mining, pillars and openings in the stacked-up veins are columnized, and careful attention is paid to the vertical design of effective barrier pillars.

The siliceous-dust hazard has generated down-to-earth research into the nature of dust-caused diseases, the control of dust at its source, the treatment of pulmonary disorders and the evaluation of dustiness in mine atmospheres. The Anthracite Institute and at least one producing company maintain well-equipped dust laboratories manned by trained engineers and techniciana.

In like manner, the problems of thin-seam mining, underground bodies of water, ventilation of old workings, handling and use of explosives and strip-mining operations have been solved in some degree through experience, research and the application of the indicated remedies. These safety lessons show up in company policies, the anthracite mining laws of the Commonwealth of Pennsylvania, the Federal Mine Safety Code and labor-management agreements.

3 How Safety Programs Are "Engineered"

The development of mine-safety engineering, in all types of mines, parallels the history of development in any other branch of engineering. In anthracite, for example, safety engineering evolved in three phases, as follows:

1. Solutions to certain problems are relatively easy because the problems are so evident. A case in point in the safety field is the practice of covering gears and belt-and-pulley assemblies, since it is perfectly clear that injuries can be caused by exposed mechanisms. This is engineering by instinct.

2. Sometimes the technical problem itself is obscure although its effects can be seen. A solution cannot be found until the elusive problem is identified. Attempts to identify a safety problem are best illustrated by the extensive research into the dust hazard, and solutions to that problem will hinge on the results of these investigations. This is engineering based on the knowledge gained through fundamental research.

3. Both problems and their solutions are affected by human nature. How men act and why they act that way have direct bearing on the success of any venture, and human factors cannot be overlooked in any branch of engineering, be it electrical, mechanical, civil, mining or safety.

Consideration of these three elements is necessary if an engineered safety program is to be achieved. Anthracite's virile interest in spreading safety-consciousness among the men who mine the coal demonstrates that the industry is aware that human factors carry at

least as much weight in promoting increased safety as the other two elements.

4 What Anthracite's Recent Record Shows

The recent record indicates, however, that a large measure of the responsibility for anthracite fatalities still can be laid to human failure, according to results of accident investigations made by the Bureau of Mines. In fact, the Bureau's study (I. C. 7609), which includes the results of investigations of 76 of the 92 fatalities that occurred in 1950, shows that 71% of the deaths resulted from human failures. Only 13 of the 76 investigated fatalities were traceable to dangers that could not be foreseen.

Here are some of the human causes of anthracite fatalities in 1950:

The foreman, who was the victim, did not have the roof examined or examine it himself.

The foreman permitted a miner to advance through crushed ground using props instead of timber sets to support the top. A man died.

Four men were killed because miners did not detect bad roof that could have been discovered by proper testing.

Three men were killed during unauthorized visits to old workings.

A man was killed 30 min after a foreman inspected a place and permitted men to continue working under draw rock. Established practice required that such rock be taken down as coal was removed.

A motorman and his brakeman were killed by a roof fall while waiting at the face for a miner to finish loading a car.

A laborer was killed by returning to the face after blasting before the miner had inspected the place.

A pitch miner fell to his death by climbing manway lagging instead of the ladder. The lagging broke.

So reads the Bureau's grim record.

It would be folly to indict only the individuals involved in the recorded accidents because so many others have taken similar liberties with safety rules and, so far, have managed to "get away with it." This penchant toward chance-taking is not confined to mining men; jaywalkers, and their name is legion, act the same way and get the same results. Gambling is a human foible.

Therefore, while safety engineering by instinct and safety engineering based on fundamental research still are vital if the favorable long trend is to continue, it becomes more and more evident that today's big safety mission calls for redoubled effort to uproot the hazards each man carries within himself. Anthracite has tackled the problem.

5 Outlook Bright for Safer Mining

As never before, the anthracite region sees labor, management and state and federal officials pulling hard and all-at-once to make safer mining a personal matter. It's the brightest spot in the picture. The current activity in teaching hazard-recognition and accident-prevention to all mineworkers is a reflection of this co-operation.

State and federal mine inspectors, the safety departments of producing companies, mineworkers' safety committees and each active supervisor ferret out hazardous conditions that might be missed by one observer but will not be missed by 10 or more.

Instructors and facilities, cooperatively provided by government agencies and companies, spread the benefits of mine-rescue and first-aid training to increasing numbers of men, with the active, sincere support of UMWA district officials.

The Bureau's accident-prevention training continues to reach out to the men who suffer the injuries or worse to show them how to work safely.

In a letter to *Coal Age*, dated Nov. 1, E. H. McCleary, supervising engineer, Bureau of Mines, Wilkes-Barre, Pa., reported the status of accident-prevention training in the anthracite region as follows:

In the period from Oct. 1, 1948, to Oct. 31, 1951, the Bureau awarded 13,358 certificates to union members and 36 certificates to supervisors for completing accident-prevention training. This is 39% of the total number of certificates issued in the United States, and the Wilkes-Barre station now leads all other USBM stations in the nation in the number of men served. Of all the anthracite workers certified by the Bureau, about 8,400 are members of locals in District 1, UMWA.

Right now six instructors are spreading the word among approximately 520 men at Nanticoke, Coaldale, Lansford and Nesquehoning.

Numerous collieries have received special certificates to show that all their employees have taken the training. They are: Pine Ridge and Delaware, The Hudson Coal Co.; Harry E. colliery, Harry E. Coal Co.; Westmoreland, Lehigh Valley Coal Co.; Glen Lyon, Susquehanna Collieries Div., The M. A. Hanna Co.; Hammond colliery, Hammond Coal Co.; St. Clair colliery, St. Clair Coal Co.; Ewen colliery, Pennsylvania Coal Co., and several small mines employing fewer than 50 men. Employment at the large mines ranged from 350 to 950 men.

New courses, designed especially for haulage employees and for all men exposed to roof-fall hazards, are in the planning stage and it is expected that training in the prevention of roof-fall accidents will begin early in 1952, Mr. McCleary reports.

All this effort requires follow-up to keep the safety lessons fresh and the gambling instinct subdued. M. J. Kosik, secretary, Anthracite Board of Conciliation, speaking at the National Safety Congress in October, presented one of anthracite's ideas for making this follow-up. Soon, safety messages will be broadcast before shifts in the changehouses at certain collieries, Mr. Kosik predicted, thus placing daily emphasis on safer working habits.

While anthracite's past record is a reflection of yeoman work by all concerned, and while the future looks bright, management, employees and safety men both within and without the industry are determined to guard against complacency. For example, J. J. Walsh, deputy secretary, Pennsylvania Department of Mines, distributes a monthly letter which is a running commentary on current performance.

The letter of Nov. 1 points to a fatality rate of 0.87 per million man-hours in the first ten mo of 1951, compared to a rate of 0.67 in 1950. Spotlighting the reason, Mr. Walsh writes: "The one black spot in the overall picture of our safety record is the roof-fall evil . . . It is most essential that your safety activities during the remaining months of 1951 should be directed toward improving supervision at the working face. This is the solution to the roof-fall evil."

Through this and other steps, anthracite has shown that it can achieve a rate of progress in safety that might well make it first in the race to attain the irreducible minimum in coal-mining accidents.

Good Living and Marketable Products . . .

TREE PLANTINGS on spoil banks like these improve the land and provide many opportunities for outdoor living, while at the same time producing marketable products at an early age. Costs for planting and maintenance are low if proper methods are used.

FOREST PRODUCTS harvested when a 20-yr-old Indiana planting was cut to make way for a preparation plant included fence posts and telephone poles (left). Black locust (right), much in demand, should be planted in with hardwood species.

How Strip-Mined Lands

How to make strip banks attractive and productive . . . What you need to know about soil conditions, planting methods and economic considerations . . . What you can learn from recent experience and research

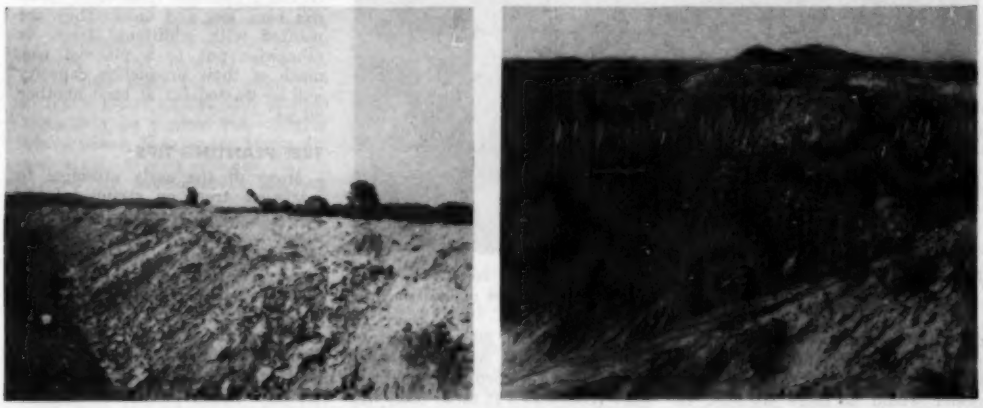
By G. H. DEITSCHMAN, Forester,
and R. D. LANE, Officer in Charge
Central States Forest Experiment Station,
U. S. Forest Service, Columbus, Ohio

STRIPPED LANDS planted with trees will produce marketable—and profitable — forest crops within a reasonable period, experience to date indicates.

Case histories of an actual harvest of a spoils planting, the growth of other plantations and the development of natural forests show that trees do grow on stripped lands—and that they grow as well or better on spoil banks than they do on old fields in their native ranges. While reliance on nature to provide a sat-

Follow Proper Planting Methods . . .

GOOD PLANTING requires trained crews and skilled supervision, selection of the right species and careful handling of seedlings. Later, necessary thinning to maintain good growth will yield products that will return a small profit on thinning costs.



SOIL CONDITIONS must be studied carefully. Variations in stripping techniques and strata overlying the coal seam influence the kinds of tree planted. While severe erosion (right) presents difficulties, fast-growing species have proved effective.

Grow Trees Profitably

isfactory forest will require a long waiting period, planted spoils, on the other hand, will produce marketable tree crops at an early age.

For good reasons, tree planting has been one of the more popular methods of reclaiming stripped lands. Planting costs usually are low, ranging from $15 to $30 per acre at present prices. Maintenance and protection costs are negligible. Planted trees grow rapidly, hide the banks quickly and provide an attractive cover. In a few years, plantings reduce bank erosion and silting of impounded lakes and provide a delightful setting for recreational areas. There is every reason to believe that while they are producing these intangible benefits, they will be growing profitable forest crops.

TREE CROPS PAY OFF

For example, a 20-yr old pine plantation on southern Indiana strip-mined land was clear-cut last spring to make way for new coal preparation facilities. The cutting produced, per acre, 445 fence posts, 63 corner braces and 31 telephone poles. These products grossed $336 per acre, equivalent to a yearly gross of about $17 per acre.

Harvesting and transportation costs slightly exceed this return, but are not too indicative of normal costs since the cutting was more in the nature of an experiment. The work was done at an hourly rate, using inexperienced mine labor. Customarily, woods workers are paid at piece rates, with greatly re-

Planted Trees Grow Rapidly . . . and Profitably . . . on Stripped Lands

LESS-ACID SPOILS containing few rocks and moist lower slopes and valleys between banks generally are best suited for valuable hardwood trees (left). Forest management seeks to encourage natural seeding by planted trees for repeated crops (right).

EXTREMELY ACID SPOILS have caused many plantation failures, though they appear plantable at first. Planting should be delayed until after effects of weathering.

duced labor costs. The products were peeled by hand, while on a large-scale operation a mechanical peeler would be more efficient. In addition, the plantation consisted of Japanese red pine and Scotch pine—species considered inferior in this region—and had not been managed for quality products. Simply by following harvesting practices, the cutting would have yielded a net return.

Forest products also have been harvested from other scattered cuttings in Oklahoma, Ohio, Indiana and Illinois. Because spoils plantings are all relatively young, only small-diameter products, consisting of posts, poles and pulpwood, have been obtained. Such records show conclusively that merchantable forest crops can be produced from young spoils plantations.

Many plantings on strip-mined lands have grown more rapidly than the same species planted on old fields within their native ranges. Recent measurements of spoils plantations averaging 20 yr of age and consisting of red, Scotch, jack and white pines revealed that the trees were from 4 to 8 ft taller than similar old-field plantings. Oaks were 7 ft taller on spoils than on old fields, and poplar and walnut grew at the same rate on both types of land. On mined lands the hardwoods were planted in mixtures with black locust.

Ten percent of the stripped land in the Central States have a natural forest cover, according to estimates made in 1946-47. In cruising a 25-yr old natural forest on northern Illinois spoils this year it was found that sawtimber-sized trees were scattered, poorly formed and limby. Except in periods of high demand, they probably cannot be sold. The younger trees show little promise of being much better. Similar results are often experienced when old fields become forested through natural processes. Contrast the pine-planted plantation cut at age of 20 with the natural forest near the same age. The plantation produced 549 merchantable sticks of timber per acre, while prospects for harvesting materials from the natural stand are remote. Over 20 yr of potential production from these spoils has been lost and unless they are planted with additional trees, or otherwise put to a planned use, much of their productive capacity will be wasted for at least another 20 yr.

TREE-PLANTING TIPS

Many of the early attempts to introduce trees on stripped lands failed because too little was known about what, when, where and how to plant. The early widespread use and almost universal failure of black locust dampened the initial enthusiasm for tree planting. Recent research conducted by the U. S. Central States Forest Experiment Station, has shown that valuable handwoods planted in these old locust stands grow several times faster than when planted on open spoils. The station now recommends plantings of hardwoods mixed with locust. Even if no locust products are obtained, the beneficial effect upon the other more-valuable hardwoods warrants planting black locust. Past failures and successes, together with knowledge gained from research, now provide guidelines for successful plantations.

The three cardinal points in planting trees on lands mined by the open-cut method are: (1) determine the characteristics of the spoils to be planted; (2) properly select the tree species to plant; and (3) do a careful planting job.

SPOILS CHARACTER VITAL

The thickness and character of strata overlying the coal varies by locations and coal seams. These fac-

tors, plus different methods of stripping, cause many variations in the chemical and physical properties of spoils which, in turn, play an important role in the failure or success of forest plantations.

Strip-mined areas in the Central States have been classified and tentative planting guides set forth by G. A. Limstrom, of the Central States Forest Experiment Station, in Technical Paper No. 109, December, 1948. His classification is based primarily on the degree of acidity and texture of the spoil surface. As a rule, nutrients are available in sufficient quantities for tree growth. The principal limiting factor is excessive acidity, caused by highly sulphurous materials, commonly located near the coal seam, being thrown upon the bank surface. Where more than 50% of the bank is so acid that vegetation will not grow, planting should be delayed until weathering has modified the toxic condition.

Susceptibility to erosion and availability of moisture for plant life are largely determined by the texture of the material. Fine-textured silty materials of loose consistency erode easily, and planted trees may be washed out, causing heavy losses. Very sandy spoils are also highly erosive and are characterized by low-moisture content. These banks often can be planted successfully with rapid-growing species.

Extremely coarse-textured spoils —those with a high proportion of rock—are difficult to plant, dry out rapidly and contain too little soil for root development. Such banks should not be planted until at least a part of the rock material has disintegrated. The majority of textural classes found on stripped land are loams and clays, which are well suited to tree growth and, unless very acid, usually can be planted within a year or two after mining.

Careful evaluation of the chemical and physical properties of strip banks is a prerequisite for establishing a successful forest plantation.

SELECTING THE RIGHT SPECIES

In addition to the effects of acidity and texture, the rough topography of spoil banks introduces other factors that influence survival and growth of planted trees, including aspect, exposure, relief, moisture conditions and degree of slope. Any combination of these factors may limit the selection of trees to plant. For instance, yellow poplar, which requires a moist loamy soil would not be expected to be successful on a dry exposed ridge. Within the limits set by the spoils itself, climate further restricts the choice of species. As an example, southern tree species such as red gum and loblolly pine have grown successfully in southern Illinois, while similar plantings failed in northern Illinois.

Fortunately, there are many species of conifers and hardwoods available for planting in all strip-mining localities from which those best suited to any set of environmental conditions can be selected. Detailed planting guides giving this information are available in several recent publications.

PLANTING THE TREES

One of the most critical periods in establishing a plantation begins when the stock is received from the nursery and ends when the trees are actually planted. Improper handling of nursery stock and poor planting have caused as many planting failures as mistakes in analyzing spoil banks or selecting species.

The first essential is proper care of the planting stock. As soon as the bundles are received from the nursery they should be broken open, the trees pulled apart and heeled-in carefully. If this is done properly, the stock will remain in good condition for several days. During heeling-in, as well as in planting, roots should be kept moist and covered. Exposure to direct sunlight or wind for only a short period will dry out the fine rootlets and kill the trees.

All planting should be supervised by a trained foreman. A few hours spent in training the crew before planting, plus constant supervision, will produce a more successful plantation. The size of the planting crew may vary according to their experience, but on spoils it should seldom exceed eight men per trained foreman. One or two additional men should be assigned to care for the stock at the heeling-in bed and to distribute the trees among the planters as the work progresses.

Trees may be planted with either planting bars or long-bladed mattocks and grub hoes. The texture of the bank material will influence the choice of planting tools. On fine-textured spoils, faster planting is possible with the bar. On rocky material with little soil, the mattock or hoe will give the best results.

For the past several years the Central States Forest Experiment Station has conducted research in forestation possibilities of spoil banks. The small federal appropriation available has been generously supplemented by operator associations and by individual member companies. Results of initial phases of this research have been published by the station in a regional report. More detailed and recent results have been, or are being, published on a state-wide basis. The publications can be obtained by writing the station, or any of its field offices. Several state agricultural experiment stations and universities also have been conducting research in spoils utilization, which includes forestation and other methods such as pasture.

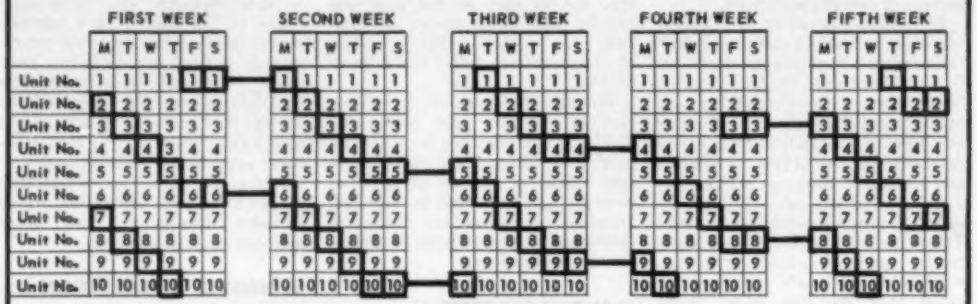
MANAGING A PLANTATION

The early phases of research on strip-mined land conducted by the forest experiment station were devoted to learning the rules for successfully establishing plantations. For the most part, this work has been completed. Some of the older plantations have reached the age where treatments are necessary if a satisfactory growth rate is to be maintained, and many younger plantations soon will reach this condition. The experiment station expects to initiate plantation management research this year. Its work will be directed toward practices needed to obtain repeated forest crops and toward development of markets for such crops.

During the first few years, plantations need little care except protection from fire and grazing. After 10 to 20 yr, cultural measures are needed to improve the quality and rapidity of growth. Such measures include pruning to produce clear, high-quality stems and thinning to concentrate growth on the best trees. Frequently, these management practices will yield by-products—such as posts, poles, Christmas trees and greens—that will pay for the treatments and occasionally return an immediate profit.

Studies of older plantations and available records of a few cutting operations show conclusively that merchantable forest crops can be produced from planted spoils, although the plantations are too young and harvesting experience too limited to provide conclusive economic data. As the plantations grow older and more experience is gained from cuttings and accompanying research, the cost-and-return aspects of growing forest crops on stripped lands will be forthcoming. There is every reason now to believe that it can be a profitable venture.

How to Gear Maintenance With Production—Five-Week Cycle for 10 Machines Every Working Day: Eight Machines Producing, Two Idle for Repair



Scheduled Maintenance

A Master Mechanic Shows How You Can . . .

Gear maintenance to your production schedule
Work your machines at top efficiency
Avoid doing maintenance work on overtime
Keep production and maintenance men happy

By W. H. CARTER, Master Mechanic
West Virginia Coal & Coke Corp., Omar, W. Va.

TO PRODUCE MAXIMUM RETURN ON INVESTMENT, a machine must operate the greatest number of hours possible. That's trite but true.

Thus the goal of every good maintenance man is to have every machine ready to operate every minute required of it.

But a machine can never be available 100% of the time for the same reason that the human body cannot work continuously. Shutdown or rest periods are necessary. The rest period of the human body is the maintenance period. Energy consumed in food is held in readiness to replace energy expended, dead cells are removed and replaced, and tired muscles are relaxed and replenished with oxygen. The result of this daily maintenance is that the body can work day after day and sometimes for years without developing serious ills.

Altogether too often the machine is expected to operate like the human body. It is run one or two shifts a day and permitted to rest the remainder of the time. Many men think this rest period is the same thing as a maintenance period. A new machine will operate for a considerable time on this schedule but gradually it will develop a number of troubles that make operation difficult if not impossible.

The trouble with a machine is that it consumes all the energy fed into it while it is running. It cannot recuperate by resting. Worn parts remain worn and they accumulate more wear during each cycle of operation. Finally they fail completely. Steel that is fatigued by vibration will fail, no matter how much rest it is given.

Planning Promotes Efficiency

The fact is, maintenance, like production can be planned in advance —and should be. Only by such planning can we utilize our machines to best advantage. Planning production does not mean that we take a map of our property, project our headings and say that we will take this or that block of coal now and leave certain others for future work. That is long-range planning and necessarily is laid out months or years in advance. It is the overall production plan and usually is followed whether the mine runs full time or only part time.

The actual production plan, like the overall plan, also should be a long-range pattern designed to produce the maximum quantity of coal with a minimum of cost. It must contain provision for maintenance. Insofar as possible, it should schedule this maintenance without overtime work.

A forecast of production, which is merely a forecast of sales provided by the sales department, is the basis of this pattern for production and maintenance. The sales department maintains close contact with business trends and, except in the most unsettled periods, can predict sales for several weeks with fair accuracy. In normal times, production is limited by what the sales force can sell. In those rare periods when demand exceeds supply, production is limited by maximum availability of the machines. (I speak here of production as meaning the total tons mined and not of machine or man-hour productivity, which always should be kept as high as possible.) Thus the production and maintenance plan must be broad enough to meet demands for maximum tonnage and, at the same

time, flexible enough to fit the periods when maximum tonnage cannot be sold.

It is my contention that a production day should include the whole 24 hr. Likewise, the maintenance program should include the same 24 hr. In other words, the production schedule and the maintenance schedule should run concurrently. Since we are somewhat limited by the awkward 8-hr portal-to-portal working day, we really can use only about 21 hr a day without paying overtime.

Working The Plan

To illustrate how production and maintenance can be planned to run concurrently with a minimum of overtime wages, let us set up a problem and solve it.

For the sake of simplicity, we will consider only the face equipment. Consider a large, well-equipped mine that has 10 production units, each consisting of a loading machine, a cutting machine, two shuttle cars, a crawler-mounted drill, an elevating conveyor and a car-spotting hoist. For the time being, the necessary mine cars and auxiliaries will be taken for granted.

Let us suppose that conditions have limited our tonnage to 200 tons per unit-shift, or 600 tons per unit-day or three shifts. Our sales department has forecast sales for 4,800 tpd for the next 5 wk. Management has decided that this production goal must be made on straight-time production labor and the barest minimum of overtime maintenance labor.

Casual examination by the production man shows that with 10 units producing 600 tpd the daily tonnage will be 6,000. The maintenance man will say, quite truthfully, that these machines, no matter what their present condition, will not operate for the next 5 wk without delays caused by breakdowns. He will say also that to reduce production delays to the minimum, he must have at least one day for maintenance for each five days in production and that he must be given the machine periodically and keep it long enough to perform major repairs.

Thus it is immediately evident that because availability of the machine cannot be 100%, production is limited by maintenance. Since we are ordered to avoid overtime work, the logical answer is to take the machines out of production long enough to do the necessary repair work. This repair work can be scheduled so that each unit comes out of service regularly after each five days of production.

Scheduling For Results

The accompanying diagram shows a schedule of production and maintenance projected for 10 units. The striking feature of this schedule is that two production units are out of production each day. All units are idle on Saturday and Sunday. Another feature of the schedule is that this off-day advances one day each week. The pattern thus gives the maintenance man a full 24 hr each week for repairs and periodically provides four days in a row during which major repairs can be made. On this projected five-day schedule, each machine operates four days or 12 shifts each week. Since the off-day advances one day each week, each machine operates five days or 15 shifts and then is idle one day, or three shifts.

With two units out of service each day, production then is limited to eight units daily, or a total of 24 unit-shifts. Since average production is 200 tons per unit shift, total daily production is 24 x 200, or 4,800 tons. Each week, each production unit works 12 shifts and produces 2,400 tons of coal. Between idle periods, each unit works 15 shifts and produces 3,000 tons.

The schedule is laid out so that Units Nos. 1 and 6, 2 and 7, 3 and 8, 4 and 9, and 5 and 10 work the same schedule. On the first week's schedule, Units Nos. 2 and 7 are idle on Monday, 3 and 8 are idle Tuesday, and so on to Friday. Units Nos. 1 and 6 are idle Friday and Monday of the following week. These idle periods are 24 hr. With two days in succession for maintenance, major repair jobs can be done that could not be undertaken otherwise. Sometimes, of course, it will be wise to use available Saturday overtime to make even larger repairs.

At the end of each 5-wk period, each unit has worked 60 shifts and has been idle 15 shifts for maintenance. The sixth week is a repetition of the first week, and on Monday of the sixth week each unit has completed a cycle of working and maintenance time and has had a weekend of Friday through Monday for major repairs.

No matter how good the maintenance program is, a 10-unit set-up should include an eleventh unit as a spare. I do not urge keeping this spare unit parked somewhere to be used only if another machine breaks down. On the other hand, production men are too much inclined to use the spare unit to mine a few tons of coal when tonnage per machine is not up to normal. The spare thus becomes a cover-up for bad management. The truth is, this spare unit should be put in readiness for operation and rotated in service on a 5- or 10-wk schedule. Whatever unit is taken out of service then can be brought to the shop and completely rebuilt, if need be.

In addition to this spare production unit, spare sub-assemblies of those items that give most trouble and cause the longest delays when they fail in service should be kept ready for immediate installation.

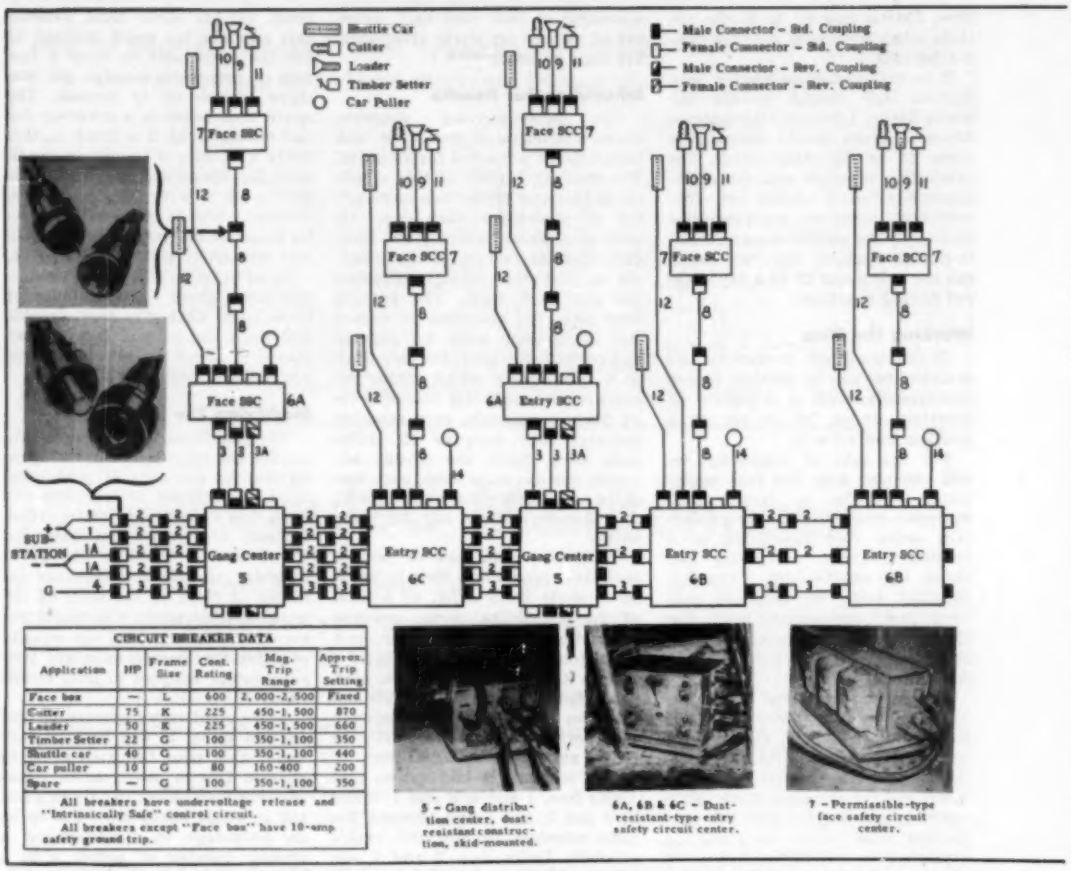
Modifying The Plan

The plan illustrated has been laid out for the calendar week with production for five days. If production must be curtailed to less than five days, the calendar is disregarded. Instead, the production days for the five-week schedule are given numbers and the numbers are inserted in place of the days of the week. A little study will reveal numerous variations that are equally effective for maintenance and possibly better adapted to local conditions.

Since eight crews operate 10 production units, it will be necessary under this plan for each crew to operate two or more units. Some workers may object to this rotation but it would easily turn out to be an advantage in familiarizing a greater number of people with a larger portion of the mine and in stimulating competition among the crews.

Another objection—and a good one, too—will be raised by the night workers. Since all three shifts are equal, the night-shift people will argue that they are penalized with the least desirable working hours and have little hope of ever moving to the day shift. This objection can be eliminated if the shifts are rotated on the same 5-wk schedule that governs the machinery. Thus each crew will share equally in the working hours. Mine management, which traditionally works the day shift and has insomnia on the night shift, will become better acquainted with a large segment of the payroll.

A comprehensive plan of preventive maintenance and scheduled repairs coupled with the above plan of production will make the lives of the production man and the maintenance man much happier and will result in maximum production at lowest possible maintenance cost.



CIRCUIT BREAKER DATA

Application	HP	Frame Size	Cont. Rating	Mag. Trip Range	Approx. Trip Setting
Face box	—	L	600	2,000-2,500	Fixed
Cutter	75	K	225	450-1,500	870
Loader	50	K	225	450-1,500	660
Timber Setter	22	G	100	350-1,100	350
Shuttle car	40	G	100	350-1,100	440
Car puller	10	G	80	160-400	200
Spare	—	G	100	350-1,100	350

All breakers have undervoltage release and "Intrinsically Safe" control circuit.
All breakers except "Face box" have 10-amp safety ground trip.

5 – Gang distribution center, dust-resistant construction, skid-mounted.

6A, 6B & 6C – Dust-resistant-type entry safety circuit center.

7 – Permissible-type face safety circuit center.

FIG. 1—TYPICAL POWER-DISTRIBUTION SYSTEM for maximum safety and low cost in underground mining. The DC system shown

Better Power Distribution

What improved power distribution, including adequate protection, means in safety and efficiency underground.

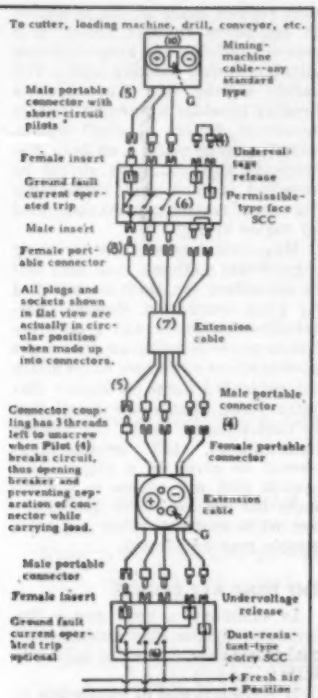
How safety and efficiency in distribution are promoted by modern protective and control devices.

By R. G. GEHLSEN

Sales Manager, Electric Connector Div., Joy Mfg. Co., St. Louis, Mo.

THE DEVELOPMENT OF TRACKLESS MINING MACHINES in recent years, with resultant increase in power requirements, has, in many instances, imposed duties on existing feeder systems far beyond their capacity to deliver. To meet the present needs of highly mobile machines, sectionalized power - distribution systems, consisting of cable, connectors and portable automatic breakers in suitable housings, have been designed and are now in successful operation at mines in various sections of the country.

Generally speaking, the latest modern mining machines are expected to produce the rated tonnage with no other action than moving out the old machines. The old sizes of wire and fuses are expected to be adequate to deliver larger blocks of power with satisfactory cable protection. Cable protection has become a new problem in that highly mobile equipment requires new duties of cable never before encountered with older methods of mining. The need for new concepts


To cutter, loading machine, drill, conveyor, etc.
Mining-machine cable—any standard type
Male portable connector with short-circuit pilots
Female insert
Undervoltage release
Ground fault current operated trip
Permissible-type face SCC
Male insert
Female portable connector
All plugs and sockets shown in flat view are actually in circular position when made up into connectors.
Extension cable
Male portable connector
Connector coupling has 3 threads left to unscrew when Pilot (4) breaks circuit, thus opening breaker and preventing separation of connector while carrying load.
Female portable connector
Extension cable
Male portable connector
Female insert
Undervoltage release
Ground fault current operated trip optional
Dust-resistant-type entry SCC
Fresh air
Position
CROSS SECTION AND FUNCTIONING OF EXTENSION CABLE
1. Pilot wire severed; breaker opens
2. Pins to minus short; instantaneous trip opens breaker
3. Pins to ground; breaker opens on 10-amp value (optional)
4. Shielded cable available when specified

is modified for AC service.

of cable protection from an electrical point of view has become evident.

Usually, the old feeder is too small to deliver rated voltage to the machine motor terminals. Twenty percent voltage drop is sometimes accepted as the maximum that should be tolerated in a DC system, when actually 15% would be better. DC power, used mostly in the States, has the handy but undesirable feature of letting a machine struggle along on low voltage, with resultant heating, high maintenance costs of electrical equipment and corresponding loss of tonnage.

AC power systems should not deliver voltage less than 90% of the machine's rated voltage because torque or turning effort goes down as the square of the voltage lost; that is, 90% voltage means 81% of normal turning effort.

CRITICAL FACTORS

In laying out an underground power-distribution system to meet present-day conditions, the following factors frequently have not received the attention they deserve:

1. Sufficient short-circuit current should be available to make the protective device open a circuit when shorting of power conductors occurs.

2. An outgoing circuit, whether it be 1,000,000-cir mil single-conductor, or multiple-conductor small-wire-size cable, should always be served by a protective device (usually in the form of an automatic circuit breaker).

Wire size and length should be selected so that when a short circuit occurs at the maximum distance away—that is, immediately before entering another protective device or the machine itself—the short-circuit current available will be sufficient to actuate the tripping device. A sufficient margin of safety should be incorporated to allow for voltage drop during short-circuit conditions. Short-circuit currents may be limited by the negative return path, made up of rails, conveyor frames and copper conductors. A good margin to use is 200% or more available short-circuit current over the actual trip setting.

Take, for instance, a breaker serving a 20-hp 250-v DC mining machine 500 ft from a power source that will hold up to 250 v when a short occurs at the far end. No. 6 cable will yield approximately 600 amp on short circuit; No. 4, 950 amp; and No. 2, 1,500 amp. It is known that this motor, upon starting, will take an instantaneous inrush of current of about 350 amp, and this is the normal instantaneous trip setting of the breaker (approximately 1/60 sec). Considering that the full-load current of the motor is about 75 amp and the short-circuit current available with 500 ft of No. 4 cable is 950 amp, this size should prove proper. Any longer or smaller wire would lead to inadequate performance of the protective device.

Consider, also, the situation where there is several thousand feet of trolley and rail between the substation and the connections to several face units, each comprising a cutter, loader, drill, etc. The voltage can be—and usually is—much lower than 250. Consequently, through high circuit resistance, the voltage available to deliver operating current is reduced, resulting in low short-circuit-current values. Thus the protective devices will be even less likely to operate properly than under the more favorable conditions previously mentioned.

Conditions are known to exist where trip settings are twice the short - circuit - current available. When shorts occur under such conditions, cable fires are the result since the protective device will not open while the arc consumes many feet of cable, with attendant smoke and acrid fumes. Fire-resistant cable becomes effective only when the arc-welding action of the energized circuit is removed.

Usually, the protective device is suspected of being defective when, actually, there is not enough short-circuit current flowing to actuate the trip mechanism.

PROVIDING GOOD PROTECTION

Automatic de-ion breakers with instantaneous magnetic trips are considered to be the best circuit-protective devices. Instantaneous trips are superior to thermal-trip devices because, when a cable or machine has reached a state of insulation fault, it should be removed from the power source instantly; that is, in 1/60 sec or so. Thermal devices and fuses require a much longer time to remove a circuit from the line and have the undesirable feature of requiring *sustained power flow* at two or more times their rating to either heat the thermal device or blow a fuse. The *sustained power flow* into a short is seldom appreciated because more shorts of the high-resistance rather

To pushbutton for testing operation of safety ground trip mechanism in automatic breaker
To Motor Terminals
Safety ground wire: size, 50% of one main power conductor
Approximately 7.5 amp unbalance current in phase wires due to ground fault will cause the breaker to trip
To mid-point of of star-connected transformer or derived neutral transformer on delta-connected systems
Power Source

FIG. 2—AC GROUND-FAULT PROTECTION (600 v or less) using core-balance transformer.

than the dead-short type are encountered.

Instantaneous trips function at the first metallic contact between even a few strands of conductors of opposite polarity. By the time the few strands are vaporized, the breaker will be open, whereas thermal trips or fuses will not have had time to function.

Breakers in switchgear distributing power to machines are fundamentally employed to provide cable protection and to ease "off" and "on" switching of machine circuits.

THE SAFETY GROUND

The safety ground wire—a controversial subject—becomes so when the ground-fault current that flows in the event of insulation failure is not used to remove the cable or machine circuit from the power source. Actually, the safety ground wire becomes a parallel path to the negative conductor and may introduce greater physical damage at the fault point than if the ground wire was left off altogether.

To benefit from the advantages of the ground wire in maintaining all machine frames at earth potential, the safety group trip was brought into existence a few years ago.

Perhaps it would be well to point out here that any attempt to use the negative power conductor as a safety ground wire, by attaching it to the machine frame, will introduce sparking between machine frames when they touch one another; for instance, a loader frame and shuttle car during the loading cycle. Sparking between machine frames must occur if the negative power conductor is used as a safety ground wire because the negative conductors are paralleled by the touching of the machine frames while carrying different ampere loads. The conductors themselves may even be of different sizes and lengths, thus introducing more IR drop to be equalized by the balancing of current at the machine-frame contact. Thus, sparking when machine frames touch introduces an incendiary arc in a potentially gaseous atmosphere. If this is permitted, there is no good reason for having permissible equipment with all arcing confined to totally enclosed housings.

Safety ground wires are said to introduce shock hazards where none existed before their use. This can be true when the negative return circuit is of inadequate capacity and is made up of rails, conveyor frames, copper wire, etc., so as to introduce voltage differences between geographic locations in the mine. Under these conditions stray currents come into existence. A wiring system such as shown in Fig. 1 is considered a good answer to this problem.

GROUND-TRIP PROTECTION

The safety ground trip is a device created for use in series with a machine safety ground wire in DC circuits (Fig. 1) to trip a breaker when a current of selected value flows—say 10 amp for small machines and 50 amp for larger machines—as a result of either an insulation fault in the machine itself or in a damaged cable. Secondary feeder cables, in systems not having sufficient short-circuit current to actuate their protective trip elements, can be protected by safety ground trips. For AC, a value of 7½ amp, plus or minus 2 amp, is accepted as good practice and is accomplished by a core-balance transformer (Fig. 2).

This device was created to provide good ground-fault protection for AC face equipment operating at 440 or 550 v. A star (wye) connected power source should be used so that the mid point becomes the origin of the ground-wire connection. Most AC systems in this country are delta-connected. If so, a derived-neutral transformer must be added so that the ground wire can be attached to the mid point. With this system, one phase wire to ground actuates the protective device, thereby reducing costly physical destruction of electrical parts.

The DC safety ground trip, as originally designed, was found to be susceptible to destruction by repeated reclosure of the breaker. Recently a thermally protected safety ground trip has been developed to protect the protective device from abuse by operating personnel.

Judging by the increased use of cables including the safety ground wire, and the number of safety circuit centers (Fig. 1) with the safety ground trip in service, the logical deduction is that the combination is quite successful. An installation in southern West Virginia, employing a system per Fig. 1, is able to produce several thousand tons per day with maintenance and renewable electrical parts costs at a remarkably low level.

Any system of power distribution must have maintenance. Well organized operating companies find it economical to install training courses for maintenance men. Personnel should be trained to fully appreciate that repairs made at the inception of equipment failures reduce first cost of repairing and keep machines running during working hours. The safety ground trip that opens a breaker provides a warning that an insulation failure of small magnitude has taken place. A cable or machine in this condition should be repaired at once, thus eliminating the cost of replacing parts consumed by major arcing.

Mine catastrophes have for their ingredients methane, coal dust and an incendiary arc. Each is controlled by good ventilation, dusting, permissible equipment and good practice in power distribution. The right combinations of failure to maintain the controlled items produces a disaster. Thus, when a new installation is contemplated or an old system rehabilitated, full consideration should be given to a distribution system that will reduce to a minimum the chances of an incendiary arc at a moment when explosive agents may be present.

THE NINE KEY POINTS

In summary, a good power distribution system for underground coal mines should pass the following tests:

1. Adequate size of conductors to deliver acceptable voltage to machine terminals.
2. Well-located protective devices to insure that sufficient short-circuit current is available.
3. Delivery of power to mobile equipment with sectionalized cable and connectors, thus eliminating excess lengths of cable.
4. Switchgear designed for portability and in an appropriate housing.
5. Design rendering it impossible for normal personnel, while making changes, to make an improper connection.
6. An individual circuit that can be switched "on" or "off" to meet operating requirements.
7. Each circuit with its own line-to-line and line-to-ground protection by high-speed circuit breakers.
8. Safety ground wires to eliminate shock hazards and arcing or sparking between machine frames.
9. Safety ground trip to remove a cable or machine from the feeder at the first instance of insulation failure.

Top management naturally must be in sympathy with and encourage the several operating departments to appreciate the various points of view so that co-ordinated effort toward high tonnage at minimum cost may be attained.

Our Defense Program Faces a Crisis

A major crisis will soon confront our defense program.

It is not a crisis in raw materials. To find enough materials, from steel to cobalt, for defense production is a serious problem. But it is one that is being solved.

It is not a crisis in manpower. Shortages of workers with special skills hamper production, but these shortages are being relieved, slowly.

It is not a crisis in manufacturing capacity. American industry's record-breaking expansion is, with very few exceptions, keeping abreast of defense needs.

The coming crisis will be one of finance. It will rise from our failure to provide the means to PAY FOR the defense program we now have under way.

A $15 Billion Deficit?

Congress has approved a defense program which is scheduled to raise *total* federal spending in the year from June, 1952, to June, 1953, to somewhere between $85 and $90 billion. Additional appropriations for more air power and atomic development, which are now proposed, would add several billion dollars.

But Congress has not approved a tax plan to match such spending. With the new levies enacted in this session, tax collections during the 1952-53 fiscal year are estimated to fall somewhere between $70 and $75 billion. That would be roughly $15 billion short of balancing the budget. If the defense program is expanded, the deficit will be that much greater.

We have not yet felt the impact of the crisis that would accompany a federal deficit of this magnitude. Federal tax collections currently are big enough to balance federal expenditures. But the defense program is scheduled to boost the annual rate of federal expenditures $25 billion in the next year.

To Meet the Crisis

By January the crisis will be clearly in sight.

Then the President will present his budget. After that, Congress must act to close the broad gap between government income and government spending. If it fails to do that, the whole defense program will be menaced by weakness in its financial foundations. That weakness might well take the form of another destructive wave of inflation.

We have three ways to meet this crisis.

The best approach, of course, is to cut unessential expenditures. That can make a real dent in the deficit. The second is to collect more

taxes. The third, and by all odds the most dangerous, is to have the federal government meet its deficit by going deeper into debt. Borrowing, which might feed inflation, can easily lead to disaster.

Near Income Tax Limits

It will not be possible to raise taxes to meet the deficit merely by increasing further the rates on corporations and on persons in the upper income brackets. Congress has about scraped the bottom of that barrel.

The Senate Finance Committee said as much in reporting this year's tax bill. The Committee reported that it had "serious doubts as to the feasibility of raising any substantial additional amounts of revenue from income tax sources." The Committee observed that recent tax legislation brings the burdens of most corporate and individual income taxpayers close to the World War II peaks, and actually carries the rates paid by many taxpayers above those peaks.

Our ramshackle federal tax system must be thoroughly overhauled in order to broaden the tax base if it is to produce more revenue—without doing much more harm than good.

The shocking fact is that no one seems ready to act along any line that might enable us to surmount the crisis.

That fact of itself aggravates the coming crisis. And next year's presidential election doesn't make it any easier to move effectively. Both parties will shrink even more than normally from backing any program that might irritate any considerable number of voters.

If we are to meet this crisis on the tax front in an orderly way, the technical work should be in progress right now. To a large extent it is being ignored.

If we are to enforce the vitally essential program of government economy, there is the same urgent need to get under way the spade work that is required.

And if—as a last miserable expedient—we decide to let the federal government drift deeper into debt, it must have a well-developed program of borrowing from individuals and other investors, such as insurance companies, rather than from the commercial banks. Borrowing from commercial banks might speedily translate the deficit into more and more price inflation. No adequate program of borrowing from savings is now in sight.

Now Is the Time

It is possible, of course, that international relations may improve sufficiently to make it safe for us to slow down the rearmament program. If that should happen, the fiscal crisis would not be so critical. But that kind of good fortune has been notably absent in recent years.

Lenin, patron saint of Communism, is quoted to the effect that to destroy a political and social system such as ours "you must debauch its money."

We shall set democracy to digging its own grave if, through our preoccupation with politics during the presidential campaign, we pave the way for further debauchery of our money.

If we really want to avert that disaster, now is the time for us to get going.

Once the crisis is full upon us, it will be too late.

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ARE YOUR BEST POWER BUY— AT ANY PRICE

They PROVIDE ample power for fast, high-production haulage—more trips per shift, dependable round-the-clock performance, with no end-of-shift slowdown, no unscheduled down time . . . ASSURE inherent safety, with freedom from hazards of fire, fumes, noise . . . SHOW low costs of operation, maintenance, repair, depreciation. SIZES for all makes of battery-powered mine locomotives, trammers, shuttle cars. Call in an Exide Representative and let him prove these facts.

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Operating Ideas

Hillside Refuse Conveyor Set on Concrete Posts

SINGLE PRECAST CONCRETE POSTS support a considerable portion of a 2,500-ft 30-in belt-conveyor system which carries crushed mine and washer refuse to the hilltop from the new Leatherwood (Ky.) plant of the Blue Diamond Coal Co. (see pp 74-87 of this issue).

The designers and builders of the complete plant, Roberts & Schaefer Co., precast these 12-in diameter posts on the job at locations near the section of conveyor being installed. Cylindrical paper forms were used and anchor bolts were cast into post tops.

Holes were excavated to rock and the bottom of the posts grouted to a concrete footer previously poured on the rock. Conveyor frames are 10 ft long and there is a post at each joint. The conveyor system, rated 300 tph, is in four sections and has a vertical lift of 482 ft.

Mining Town First to Use Plastic Pipe for Water Supply

A COAL MINING COMMUNITY in West Virginia, with a population of some 1,400, is reportedly the first corporate city in the country to use plastic pipe for a municipal water-supply and distribution system.

Just completed after 3 mo of construction at a cost of $130,000, including a 100,000-gal storage tank, the new system will serve Pax, W. Va., and its two unincorporated neighbors, Wierwood and Long Branch. Difficult trenching conditions, plus an acid-producing shale formation, dictated use of some 25,000 ft of the flexible corrosion-proof pipe made by Yardley Plastics Co., reported Dennis M. Leary Jr., consulting engineer of Beckley, W. V., shown inspecting the pipeline above (far right). The town is surrounded by steep hills and there is a 230-ft elevation differential between the high and low points in the 3-mi system, as indicated in the view of the town taken from the site of the storage tank (above, left). Some 5% of the ground is solid rock. The water system also will provide an adequate reserve for emergencies such as fire fighting and the like.

Complete Line of Roof Bits Assures Drilling Efficiency in Any Roof Condition

A unique feature of the Kennametal line of roof bits is that they offer a particular bit for a particular job. This allows the mine operator to obtain from the Kennametal selection a bit that will give maximum drilling efficiency, however easy or difficult drilling conditions may be. The fastest drilling bit of the three is the Style RD Series which drills the more easily drilled roof material like shale and slate. Style HFD Bits which are a radical departure from conventional drill bits are for drilling the medium hard substances encountered in mine roof such as laminated sandstone. Their drilling speeds exceed those of the rock bit, and they can, like the Style RD, be used in coal drills that have been converted to roof drills or in regular roof drills. The Style PT is a multiple-point bit that gives impressive drilling speeds of 10% to 15% faster than those of other multiple-point bits.

John E. Noel Helps Out On Drilling Problem

John E. Noel is the Kennametal representative in Illinois. His experience in the coal industry covers a period of 25 years. When operators in his territory call him they do with confidence in his ability. An example of this was a mine where roof had begun to show signs of weakness over the main haulage belt in a new opening. When John was called he brought the right equipment to do the job efficiently even though working over a belt. He also assisted the drilling crew as it was their first job of this kind. Like Kennametal representatives everywhere, John Noel was able to help these operators make substantial savings by having the right experience and the right drilling tools to help them out.

(Advertisement)

Users of Kennametal Tungsten-Carbide Bits can get more tonnage per shift, and more shifts per bit life by practicing Kennametal's simple bit maintenance recommendations.

FIRST—Determine the point (in places cut or feet drilled) at which the bits *begin* to dull *in your mine*. Thereafter, at that established point, remove bits for reconditioning and replace with sharp bits.

SECOND—Sharpen the bits as recommended for your type of seam—the most efficient cutting angle varies for soft, medium, and hard seams. Kennametal Grinding Instructions booklets carry full details, are available to you free.

THIRD—Use the grinding procedures and the types of grinding wheels specified for tungsten-carbide tools. Do not quench the bits, and always avoid overheating them. Complete descriptions are contained in Kennametal Grinding Instructions booklets, free on request.

Along with increased tonnage, proper bit condition assures further advantages: Machines work easier—there is less strain on cables, jacks, and drives; armature burn-outs are reduced, as are other failures resulting from overloads; bits are ground easier and faster, bit cost is lower, because only a small amount of carbide needs to be ground away; machine and drill operators work more efficiently when they know their bits are always sharp.

Your Kennametal representative will be glad to show you how a bit maintenance plan can give you better tonnage, reduce your costs. Contact him! Kennametal Inc., Latrobe, Pennsylvania.

Names of Kennametal Representatives appear in the McGraw-Hill Mining Catalogs

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DRILL BITS • MACHINE BITS • ROCK BITS • ROOF BITS

Specialists in Coal Cutting and Coal Drilling with Tungsten-Carbide Tools

Colored Wires Identify Repairmen and Prevent Mistakes

THE SAFETY OF MAINTENANCE MEN working in a large preparation plant requires a sure system of keeping the equipment units under repair locked out of operation. At Sunnyhill No. 8, a 7,000-tpd washing plant of the Sunnyhill Coal Co., New Lexington, Ohio, this is done by supplying each of the eight mechanics with short pieces of colored plastic insulated No. 14 copper wire, which each man uses to tie into the off position the starter handle controlling the particular unit on which he is working.

All starters are in the main control room, and the wires are kept on the wall there hanging on nails labeled with each man's name. For example, 10 pieces of yellow wire hang on the "John Doe" nail. Since each man has a different color, the yellow wires locking out Units 143 and 144, as shown in the illustration, indicate that "John Doe" is working on that equipment. Only he, personally, is authorized to remove his wires.

The color identification is necessary to make it highly unlikely that one mechanic will by mistake ever remove a wire another man has put on a starter. Also, the identification is necessary to trace a mechanic who might forget to remove a wire and thus hold up starting of the plant.

PROPER LUBRICATION, adjustment of working parts and cleaning inside and out, as explained step-by-step in this maintenance summary, will help you get better and longer service from your crawler tractors this winter.

Here's How to Winter-Condition Your Crawler Tractors

By FRED J. SHRECK
Supervisor of Service, Industrial Power
International Harvester Co., Chicago

OLD MAN WINTER pulls no punches and plays no favorites. He packs an icy wallop and blows a cold, cold blast. One thing you can bank on for sure: Winter downtime will cost you money unless you winter-condition your crawler tractors right now.

Cold weather repairs are difficult to make in the field. The strain of low-temperature starting and the use of incorrect grades of oil often turn small defects into breakdowns. So don't even try just "getting by" this winter. If you haven't already done so, start your preventive maintenance program for crawlers at the first opportunity before the cold sets in. These suggestions will help you make your tractors last longer and stay on the job without failures.

INSPECT FOR OIL LEAKS AND WASH DOWN

1. First, check for oil leaks. Look for collections of new oily dirt in odd places. With a dirty engine, look for places where leaking has streaked the dirt. Then make the same careful inspection of the engine transmission and final drive housings, the sprocket gear and track rollers.

2. Clean the tractor and engine for these four basic reasons: (1) aids proper cooling of engine; (2) oil leaks show up faster; (3) decreases fire hazard; and (4) gives operator more pride in his tractor.

3. Proper engine cooling is especially important in cold weather because the lighter winter oils run hotter than heavier oils, and the oil film protecting moving parts gets thinner as oil temperature rises. Thus, any crankcase dirt pack left on reduces proper cooling of light oils and their lubricating effectiveness. Cleaning can be done with high-pressure hose or

HAULAGE WAYS *Jr.*

Heavily loaded cars present no problem when cars are equipped with O-B Couplers. Rubber draft gear in O-B Form-8 couplers can absorb impacts as high as 100,000 pounds.

Haul Bigger Cars Faster with O-B COUPLERS

High capacity, durable rubber draft gear in O-B Automatic Mine Car Couplers provides the stamina the couplers need to resist the damaging effects of repeated bumps and jerks. Able to absorb impact blows as high as 100,000 pounds, this draft gear allows you to pull heavier trips without damage to any part of the coupler.

Broad pushing areas on the tail ends of O-B Couplers prevent the cars from taking a zigzag position on the track in spite of bumps and jerks. With this assurance of track stability, higher haulage speeds are possible.

The ability to haul large cars faster with O-B Automatic Mine Car Couplers – and to do it safely – is a feature you'll want to know more about when it comes time to overhaul your cars or to replace them. Talk it over with your O-B representative, or write to Ohio Brass Company for complete coupler information.

Ohio Brass

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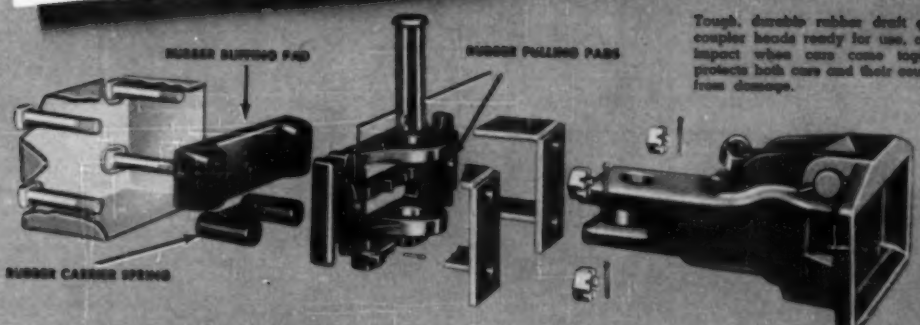
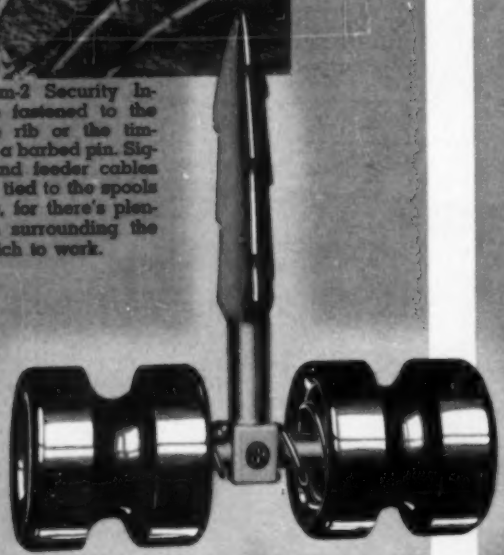


Tough, durable rubber draft gear keeps coupler heads ready for use, absorbs the impact when cars come together, and protects both cars and their coupler heads from damage.

HAULAGE WAYS *Jr.*

KEEP YOUR OVERHEAD NEAT WITH O-B Feeder Wire Insulators

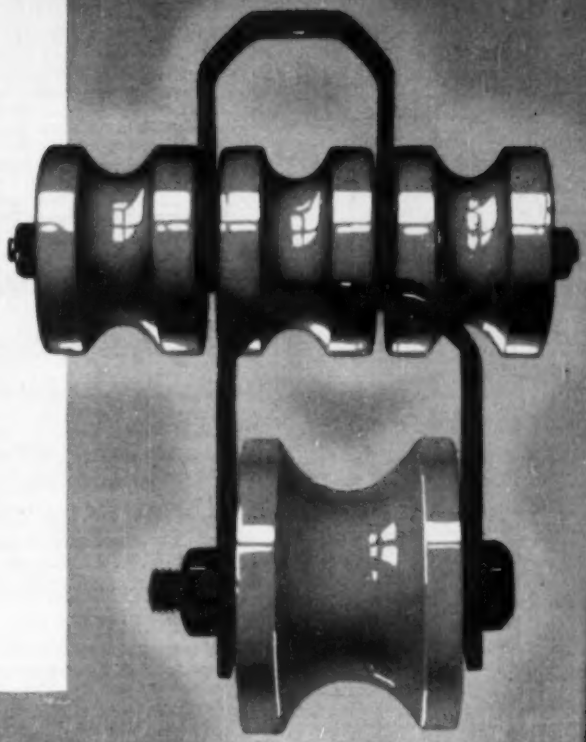
● O-B Form-2 Security Insulators are fastened to the roof (or the rib or the timbering) with a barbed pin. Signal wires and feeder cables can then be tied to the spools without fuss, for there's plenty of space surrounding the spool in which to work.

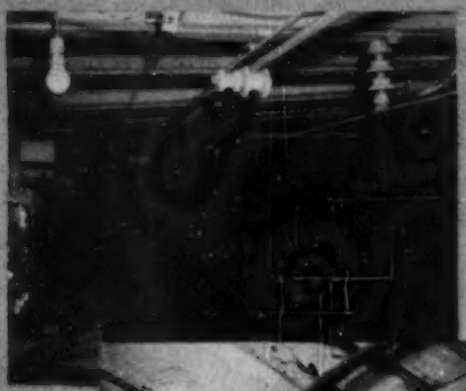


● Three illustrations show how Type-C Feeder Wire Insulators simplify feeder wire installations. One indicates how other standard O-B fittings can be used on the job to advantage: an O-B I-Beam Adapter holds one insulator clevis; the other is bolted to an O-B Pipe Adapter, and the pipe fastens to the timbering with an O-B Universal Adapter. Another illustration describes an operator's answer to the need for increased feeder capacity, by adding a second spool to the original single spool insulator. The O-B Triple Horizontal Insulator (third illustration) neatly solves the problem of holding feeder, signal and lighting wires on a single unit.

● The handling and maintenance of feeder wire becomes a simple matter when you use the right equipment to hang your wires high, taut and out of the way. Keeping wires out of trouble's path in this fashion is a good way to prevent interruptions in the power supply or in your communications system.

You can clean up some wire maintenance problems, and clean up the appearance of your haulage way at the same time, with these easily-installed O-B Feeder Wire Insulators. Why not try them in new sections where they'll prove their value quickly?





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O-B Porcelain Insulators and accessory equipment are shown on pages 41 through 45 of your O-B Mining Catalog. Why not check these pages for suggestions that will work in your mine?

HAULAGE WAYS *Jr.*

You'll Profit from these Wedge Bond Advantages

Permanent Bonding—Fast Bonding
Repeated Use

The O-B Wedge Bond is the most durable, the simplest, and the most economical mechanical type rail bond you can use in your haulage system. Here's why:

1. Permanent Bonding. Force exerted by the wedge against the bond terminal causes a permanent mechanical and electrical joint by "cold welding" the terminal to the inside of the hole at 20,000 pounds pressure.

2. Fast Bonding. One man, equipped with an O-B Mobildrill, a hammer, and a steady supply of wedge bonds, can keep up with your track crew, and bond the rail as fast as it is laid.

3. Repeated Use. Wedge Bonds can be reclaimed for a second or third time. Because the terminals are unimpaired when they are removed from the track, the bonds can be put to use again immediately without need for cleaning up or repair.

For further information on O-B Wedge-Type Rail Bonds, write to Ohio Brass, or ask your O-B representative.

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4096-M

steam, but a 2-in low-pressure stream is preferable. Wipe off the bad spots with diesel oil or kerosene. Using low-pressure water eliminates the possibility of damage to gaskets or seal points.

LUBRICATION SYSTEM

1. Begin at the crankcase. Engine oil gets heavy with use because the light ends of the oil burn off in combustion, leaving the heavier base oil. Drain old oil from a thoroughly warmed-up engine, preferably after a day's run.

2. Then flush crankcase with regular crankcase flushing oil—not diesel fuel or kerosene. (Sometimes, when kerosene or diesel is used, enough is trapped inside to cause foaming of the new oil when crankcase is refilled.) Run the engine at half throttle with the flushing oil for half an hour. Drain oil filter, wipe inside with clean rags and replace old filter elements with new.

3. Now refill crankcase with grade of oil recommended by manufacturer for temperature at which tractor is to be operated. Change oil in fuel injection pump but do not flush.

4. Transmission, final drive and sprocket drive are next. Lubricants in these become heavier with use. In fact, if high-viscosity lubricants are left in too long, they will lose good lubricating characteristics and tend to "channel" around the moving parts so that the parts run dry. As these units heat up in use, dirty oil on outside of the housing is sucked inside through any seal leaks or the ventilator.

Metal-wear particles also become mixed in the lubricant. If there is any doubt of this, magnetize a rat-tail file and stick it in the housing. It will come out covered with metal particles that can cause serious wear. For these reasons, drain the lubricant without fail even though the units appear full. Then put in flushing oil; not kerosene or diesel fuel, and run tractor 15 min not under load. Drain or refill in accordance with manufacturer's recommendation.

5. Then refill the lubricating gun with proper lubricant and force old lubricant out of track rollers with the new. Follow this with a complete chassis lubrication. Wipe off excess lubricant. It gathers dirt and is sometimes drawn back into lubricated point by heat, causing rapid wear.

ELECTRICAL SYSTEM

1. Clean battery terminals with a solution of warm water and baking soda, using a wire brush. Dab grease or special paste on terminals and tighten them. Also check specific gravity of cells with hydrometer. Water level should be brought up with distilled water. Continual low water in battery is an indication of an overcharge condition which calls for corrective action by authorized repair personnel.

2. Look for worn-out brushes on the commutator and generator armature. Here again, repairs should be made only by distributor's mechanics.

3. Voltage regulator, starter and generator should be checked, tested and adjusted. This can be done effectively only by a qualified mechanic, using proper testing equipment. This equipment is portable, however, and can be taken to the job-site by most distributors.

4. With a bad connection or corrosion, voltage regulator will not work properly, causing high voltage and low batteries. This is indicated by continual low water in battery and premature wear of commutator and brushes.

5. Next, visually check brushes and bushings of starter and commutator.

COMBUSTION SYSTEM

1. For fast starts and peak efficiency during winter there's nothing more important than proper adjustment of the combustion system. Start by cleaning plugs and properly spacing the gap. Check all spark plug wires and connections.

2. Adjust or replace magneto or distributor points as needed. Clean magneto impulse coupling with kerosene and lubricate with a light oil. SAE No. 10 is satisfactory in most cases.

3. Don't overlook the air cleaner. It should be removed and disassembled. Wash out with diesel fuel or kerosene. Reassemble and fill with recommended grade of oil, usually the same as used in crankcase. Be sure to check all air-cleaner connections to inlet manifold. See if leaks are indicated and make repairs where necessary.

4. Diesel-fuel filters and water traps shouldn't be passed over. Take them apart and wipe out with clean rags. Otherwise, water and debris will cause a starved condition and reduce engine power as fuel gets heavier with cold.

COOLING SYSTEM

1. First check for leaks in the head gasket. To do this, remove radiator cap and fill level with cap. Start engine, and after running long enough to open thermostats, accelerate suddenly. If bubbles appear, it is a good indication that cylinder head gaskets leak. Also check for leaks in hose and hose connection and water-pump packing. Check radiator for leaks by careful visual inspection.

2. Flush radiator with flushing compound or a solution of baking soda. Leave radiator cap off and run until hot. Drain and flush with clean water. Drain and refill with antifreeze called for by manufacturer.

3. Also check the fan belt and fan-belt drive pulley for looseness and adjust.

4. A good way to clean the outside of the radiator is to splash water from a 1-lb coffee can through the fins with the engine at high idle. The fan will draw water through radiator and suck out a lot of debris lodged between the fins that can't be seen.

Why Keep Mum?

. . . ABOUT YOUR "OPERATING IDEAS" that have worked successfully for you. Other coal men will profit from your experience if published in COAL AGE, and we will gladly pay you $5 or more for each acceptable idea, on publication. You don't need to dress up your ideas. Just write us, explaining what it is and what it does and enclosing a rough sketch or photo if you have one. We'll do the rest. Write: The Editor, COAL AGE, 330 W. 42 St., New York 18, N. Y.

CAUTION: There is danger of breaking the fan blades by this method if more than 1-lb coffee can of water is used at a time.

ENGINE VENTILATING SYSTEM

1. To insure proper combustion and lubrication, clean the complete engine-ventilation system, including crankcase breather on side of engine, breather pipe and elbows on top of valve cover. This is important because these pipes take out condensation that often causes corrosion and failure of valve springs and rocker arms. It is one precaution that should be underlined.

2. Furthermore, it is recommended that engine-ventilating systems be checked frequently during cold weather.

COLD WEATHER STARTING TIPS

1. For tractors working and parked for extended periods in cold, it's a good idea to equip them with hood sides.

2. Avoid parking tractor in exposed place for a long period without running. If necessary to keep it out in winter, run it at least once every day.

3. In temperatures of 10 deg or below, dilute oil in air cleaner and crankcase with kerosene in accordance with manufacturer's specifications.

4. Fill fuel tanks at end of work day to prevent collection of moisture.

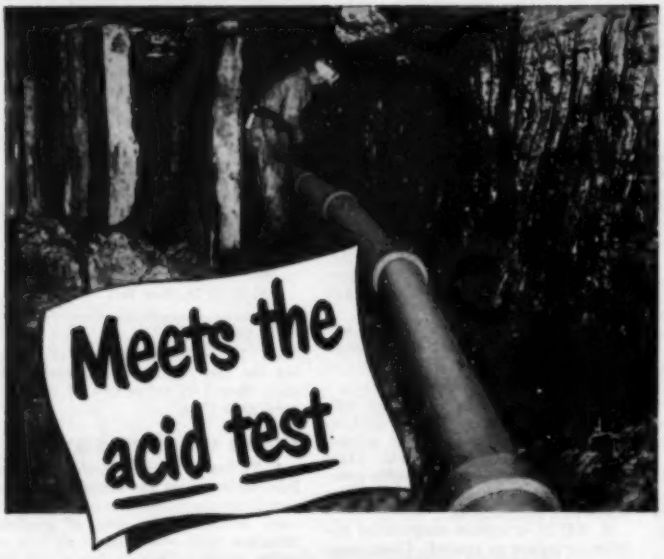
STORING TRACTORS IN WINTER

1. Store tractors in a dry and protected place after thoroughly washing and cleaning them.

2. Completely lubricate tractor. Drain diesel fuel tank, water trap and fuel filters and open air vents to secure complete drainage. Then close vents. Work flushing oil through the fuel-injection system as recommended by manufacturer.

3. Drain all water from cooling system and drain all gasoline from gas tank, strainer bowl and carburetor.

4. Attach an oil can to an air gun and, using a light oil with rust inhibitor, spray inside the spark plug holes, inside the valve cover and all surfaces above oil level. Then spray inside of gas and fuel-oil tanks.



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The factory-made joints are assembled with a simple coupling puller.

Curves can be negotiated with Transite Mine Service Pipe. Deflections up to 5° can be made at each joint.

Tough, strong asbestos fibres help give this pipe many of its outstanding qualities.

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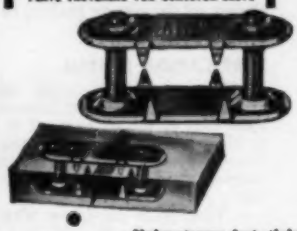
TRANSITE *mine service* PIPE

PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS



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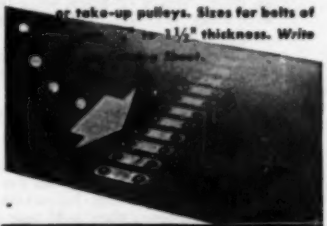

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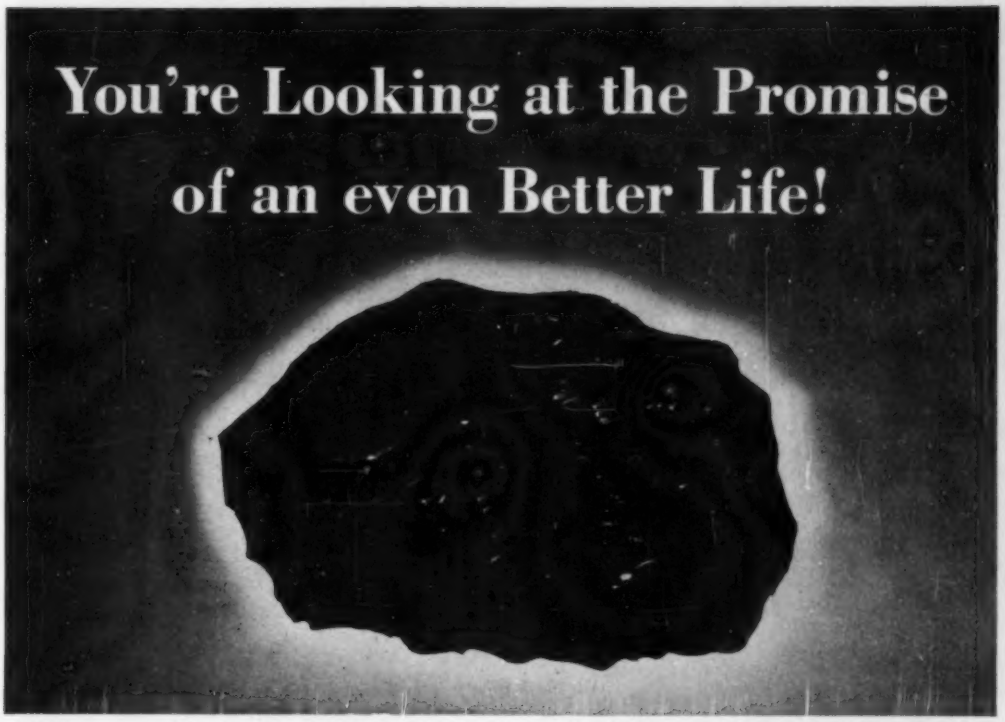

A lump of coal? . . . Yes, a lump of coal!

For no one can foretell the great things still to come from this basic and abundant resource.

Already, almost 70% of all the fuels used by America's electric utilities is coal—and each ton of steel needs a ton of coal in its making. Coal supplies 45% of the heat for our homes, factories and public buildings. And coal is the "miracle" ingredient in thousands of useful new products—perfume and plastics, synthetic rubber and sulfa drugs.

Coal is fertilizer for our farms, cement for our buildings. Coal provides steam and electric energy which spin the machines in our factories.

Today coal supplies power to make the good things that make up our good life. In the future, coal will make more products available to more people at the lowest possible prices.

How fortunate there's coal enough to power America's progress for hundreds of years! For coal accounts for 92% of America's entire fuel reserves.

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- **Lowest-priced fuel almost everywhere!**
- **Modern automatic equipment cuts labor costs.**
- **Easiest and safest to store *of all fuels!***
- **America's vast reserves make coal's supply always dependable!**
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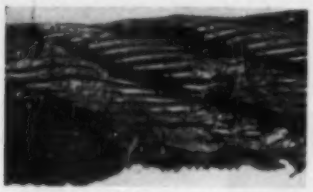
FOR ECONOMY AND DEPENDABILITY

YOU CAN COUNT ON COAL!

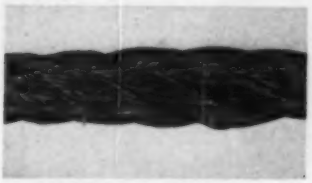
Foremen's Forum



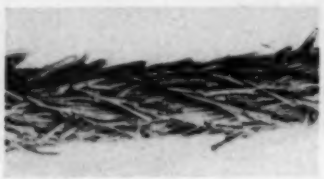
FLAGRANT ABUSE chewed up a good rope before the wires showed excessive wear.

LACK OF LUBRICATION ruined the core and then the carcass of this wire rope.

SCUFFING the rope over and against other wraps on a flat-faced drum did this.



REPEATED UNEVEN WINDING on a drum crushed and flattened a good rope.



PREFORMED ROPES are safer for handling. The preformed rope (right) has taken as much wear as the non-preformed rope (left)

How To Use Wire Rope

Mine supervisors and master mechanics must know: (1) What it is, (2) How it's made, (3) How to install it, (4) How to care for it, (5) When to change it

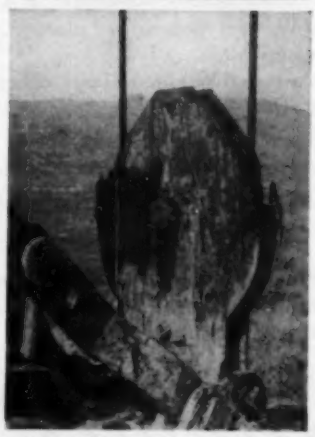
MANUFACTURERS OF WIRE ROPE think of their product as a machine in the sense that it consists of many parts, fabricated to close tolerances, which work together when the rope is in action. Like other machines, it should be (a) carefully selected to match its job, (b) properly applied and intelligently used and (c) frequently inspected and properly maintained.

Production and maintenance supervisors, who may have to recommend types of ropes to be used for specific applications and who certainly are charged with the responsibility for getting the best possible service out of wire rope, can best discharge their duties if they know the strong points and limitations of this equipment.

HOW WIRE ROPE IS MADE

Raw material for wire rope usually is hot-rolled rod of improved plow steel, plow steel, mild plow steel, cast steel, traction steel or iron, in descending order of tensile strength. In the wire mill this rod is cold-drawn through dies of tungsten carbide or other hard material to reduce the diameter of the rod to that required in the rope to be made. Since more than one pass through the dies may be necessary, intermediate processes, such as heat-treatment and pickling, relieve internal stresses and remove surface imperfections between passes.

In the next step, several coils of wire are placed on a stranding machine and twisted into a strand. Each wire is lubricated before it is laid



STUCK INCLINE ROLLER (top) sawed rope and ruined roller. Ragged edges on bucket bail will soon tear rope apart.

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into the strand. Then the resulting strands are fed to another machine where they are "closed" into a wire rope. The strand- and rope-making machines may rotate in either direction but simple definitions adequately describe the products that result.

A right-lay strand or rope is one in which the wires or strands resemble the threads of a conventional screw to an observer viewing the strand or rope longitudinally. In other words, in a right-lay rope the strands cross over the top of the rope from left to right. In a left-lay rope, the opposite is true, the strands crossing over the top of the rope from right to left.

Regular-lay rope is that in which the wires in the strands and the strands in the rope are laid in opposite directions. For example, the strand is left lay and the rope right lay, or vice versa.

Lang-lay rope is that in which the wires in the strands and the strands in the rope are laid in the same direction; both strands and rope are right lay, for instance.

IDENTIFYING ROPES

Rope identification is based upon its construction features. A 6 x 19 rope is made of six strands with 19 wires in each strand, a 6 x 7 rope has six strands of seven wires each, and so on. A 6 x 19 filler-wire rope has filler wires of small diameter in the interstices between the larger wires in each of the six strands. A 6 x 19 Seale rope has wires of larger diameter on the outside of each strand than those inside the strand. There are many different constructions but the 6 x 19's are mentioned because of their popularity and the latitude of their application. They are made with either metallic or fiber cores, and find many applications in deep and strip mining.

Furthermore, wire ropes may be classified into two other groups, preformed and non-preformed ropes. Preforming, a process developed about 27 yr ago by the American Chain & Cable Co., Inc., forms each wire and strand into the helical shape it will assume in the finished rope, thus eliminating the natural stresses that are built into non-preformed ropes. In non-preformed, the wires and strands exert constant strain to resume their original straightness. In a preformed rope, the wires and strands lie at ease and such ropes are not "lively."

An example may serve to highlight the precautions that must be observed in selecting wire ropes for specific applications.

A lang-lay rope offers better resistance to abrasion by pulleys and sheaves than regular-lay rope because a greater length of the outer wires is in direct contact with these members. A regular-lay rope, however, offers better resistance to distortion on a drum.

Such examples of different types of ropes and the recommended applications of each type could go on and on. To wrap it up, don't specify a rope for any new job until you have studied the conditions under which the rope must operate. Then select a rope from among the many types offered that best satisfies the conditions. The engineers of any rope manufacturer will be happy to help.

INSTALLING WIRE ROPE

Correct installation of a new or replacement rope probably is your major concern. Here are some hints to guide you.

1. Best practice for removing the rope from its reel consists of placing the reel on a shaft and jacking it up to provide free rotation. Set the assembly so that the rope can be pulled from the bottom of the reel, thus helping to keep the wraps of the rope from becoming fouled. However, if the rope is to be taken from the reel and overwound directly onto a drum, you better take it from the top of the reel to prevent twists or kinks.

2. If the rope is received in a coil, unroll the coil along the floor or place it on a turntable and remove the rope as from a reel. Guard against kinks in removing non-preformed rope from a reel or coil. If a severe kink develops you will never be able to trust the rope on a job where safety is paramount—and that means all jobs in mining.

3. If the new rope is to be wound on a smooth drum, determine whether the rope is right or left lay. If the drum is underwound, start a right-lay rope from the right flange and a left-lay rope from the left flange, as viewed from the back of the drum. If the rope comes over the top of the drum, start a right-lay rope from the left flange and a left-lay rope from the right flange. The wrong procedure results in spaces between the wraps which injure the rope and shorten its useful life.

4. Check sheaves and drums for imprints left by the old rope, under-diameter grooves or rough surfaces. Equipment showing these defects should be repaired or replaced because they'll play havoc with new ropes. Repairs or replacements will be cheaper than the sacrificed life of the rope.

5. Be sure sheave diameters and groove diameters are those recommended for the size of the rope being installed. A groove that is too large provides no lateral support, while one that is too small provides poor bearing for the rope. In an oversize groove a loaded rope will flatten and flex on the sheave, and in an undersize groove the rope will be badly pinched. An undersize sheave will bend the rope excessively. An oversize sheave will act as a flywheel. The rope will slide on the sheave until it gets the sheave up to rope speed or the sheave will continue to turn under the rope when the rope stops. Either condition is hard on the rope.

6. Do not let the fleet angle exceed 1½ deg for smooth drums or 2 deg for grooved drums. Preferably, fleet angles on each side of the drum's centerline should be equal. Fleet distance (centerline of drum to main sheave) should be about 29 ft for each foot of width of a grooved drum or 40 ft for each foot of width of a smooth drum. Avoid excessive fleet distance because it leads to whipping of the rope.

7. Check equipment operators. In a published interview with H. W. Richardson, editor, *Construction Methods and Equipment*, W. C. Russell, chief wire rope and product engineer, The MacWhyte Co., says wire rope takes most of its abuse from careless operation. Mr. Russell believes that jerking and snapping of the line, usually the result of a fouled-up drum, is a cardinal sin. Check the setting of friction clutches, Mr. Russell suggests, to give the rope a break, not break the rope.

MAINTAINING WIRE ROPE

As mentioned previously, wire rope is a machine, and as such it requires maintenance. Here, maintenance includes inspection, lubrication, splicing, socketing and attaching fittings, with our discussion confined to practical tips and reminders.

Your overriding purpose for making a rope inspection is to detect changes in the rope which might indicate that it can no longer do its job while providing an adequate factor of safety. The diameter of the rope, from the crown of one strand to the crown of the strand on the opposite side, should be checked at points where maximum wear is encountered. A reduction in diameter indicates a loss of strength through abrasion or stretching.

The rope should be examined for broken wires, and when a break is found the strand containing the break should be examined for at least one complete lay on both sides of the break to be sure the broken wire does not indicate severe deterioration of the rope.

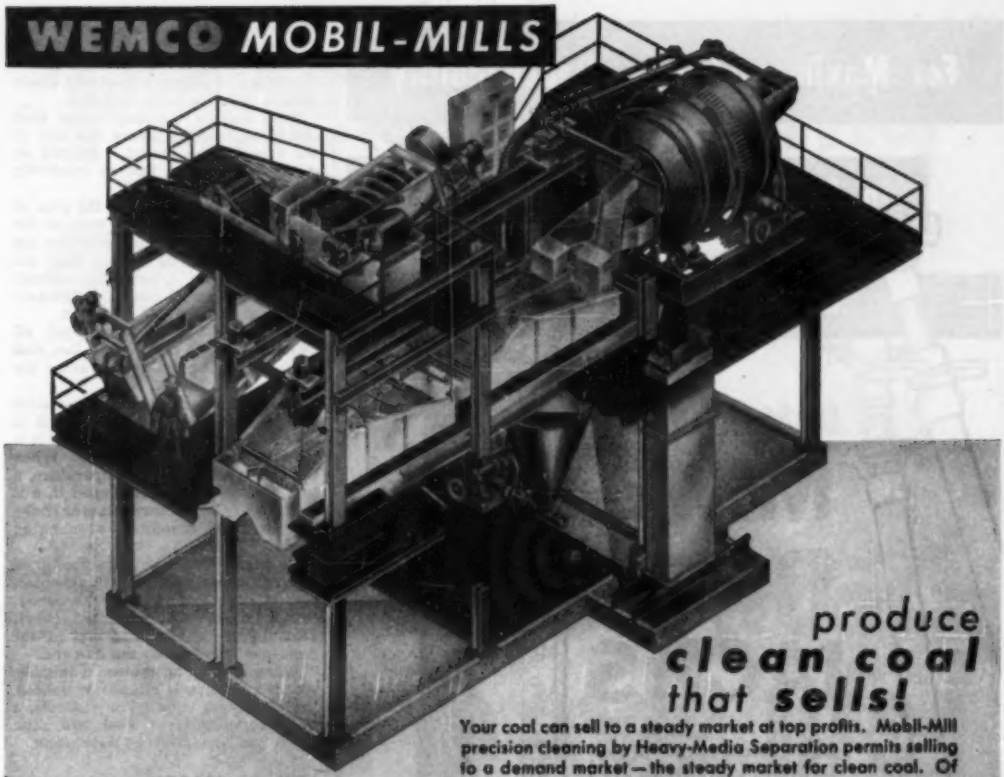
Look for evidence of deep corrosion. Acid mine water and high humidity accelerate corrosion underground.

Check the lubrication of the rope. When it was made, the core of the rope was impregnated with lubricant, which is squeezed out into the strands as needed when the rope goes to work. After a period of time this lubricant plays out and your inspection may reveal that the rope needs a bath in the proper lubricant.

Good splicing is an exact science. The man who does your splicing should be an expert and only splices made by experts should be placed in service. If you wish to train another splicer, give him plenty of practice, and test his splices until you are satisfied with his progress. A bad splice may not develop 50% of the strength in the rope, but a good splice will be from 80 to 90% as strong as the rope itself.

Socketing, too, requires the best

WEMCO MOBIL-MILLS



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Nearly out of business because of a rapidly diminishing demand for unwashed coal, this Illinois operator installed a #3C WEMCO Mobil-Mill to wash approximately 60 TPH of 4" x 3/8" coal. Results were impressive. 91% of his total feed was recovered as readily saleable clean coal with ash content reduced from 13% to 9.1% (6% inherent ash). 99½% of the Mobil-Mill washed coal reported as true float (by heavy liquid test), and media consumption was only 0.67 lbs. per ton of H.M.S. feed. As a result, this operator now produces a product which more than meets his market demands.

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efforts of one of your better men. Assuming that you are familiar with the technique of socketing, here are a few reminders of points you should check while a socket is being installed.

Pure zinc is the only metal that should be used to secure the end of the rope in the basket. Babbitt or other metals may fail at relatively light loads.

Line up the socket with the axis of the rope and be sure the ends of the separated wires are flush with the top of the basket. Be certain that the wires are clean. A petroleum solvent, then muriatic acid, then a water-and-soda neutralizing bath will do it.

Preheat the socket to expel all moisture and to keep the molten zinc from solidifying before it reaches the bottom of the basket.

Proper temperature for the molten zinc is from 800 to 875 F. If it is too hot it may anneal the wires; if it is too cold a poor bond will result. When the zinc is at the right temperature, a soft pine sliver can be dipped into it and quickly withdrawn without showing signs of scorching or clinging zinc.

In supervising the attachment of fittings, check for proper assembly, perfect alignment and utmost security. In applying U-bolt clips, the U-bolt should bear on the dead end of the rope and the plate on the live end.

When making an eye use a thimble, whether the eye is clipped or spliced.

Use enough clips. For example, a ½-in rope needs at least two clips, and a 2-in rope needs at least seven.

TIME TO REROPE

No hard and fast rule can be laid down with regard to rope changes because conditions vary so much. On the other hand, as in the case of shaft and slope main ropes, the decision may be out of your hands, because such ropes usually are changed according to a regular schedule.

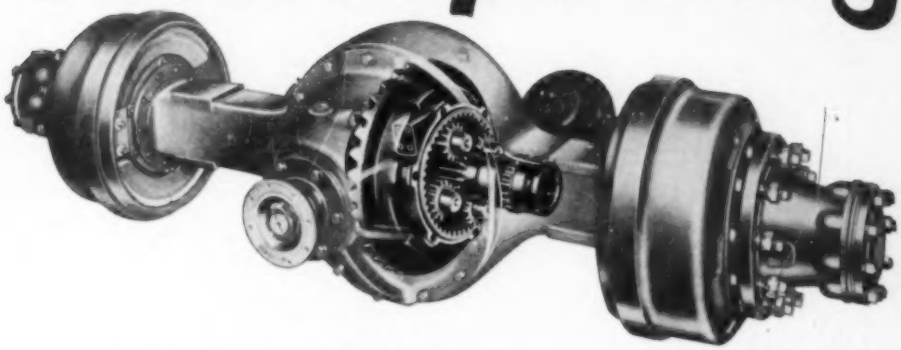
Where the decision is yours, you must decide on the basis of your periodic inspections. If the rope is badly corroded, excessively reduced in diameter, kinked, knotted or shows signs of broken wires, you will be justified in asking for a new one.

Worth Remembering

Ralph Waldo Emerson tells a story about trying to get a calf into the barn. While Emerson pushed the calf from behind, his son pulled on the calf's head from the front. The calf stiffened his legs and bleated. The more they pushed and pulled, the more the animal resisted and the louder he bawled. Then along came a farm girl. She put her finger into the calf's mouth for it to suck and led it slowly and easily into the barn.

Emerson says that both he and his son were making the same mistake. They were thinking only about what they wanted. They forgot what the calf wanted. —*Rubber Safety*

Planetary Gearing



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In one of the seven "torture" tests given to this cable, a sample of Royal jacket (0.100 inch thickness) is first weighed, then immersed in distilled water at 70 degrees C for seven days. It is then removed and weighed and the amount of water absorbed is calculated. U. S. Royal Mining Machine Cable's jacket absorption is never more than 60 milligrams per sq. in.

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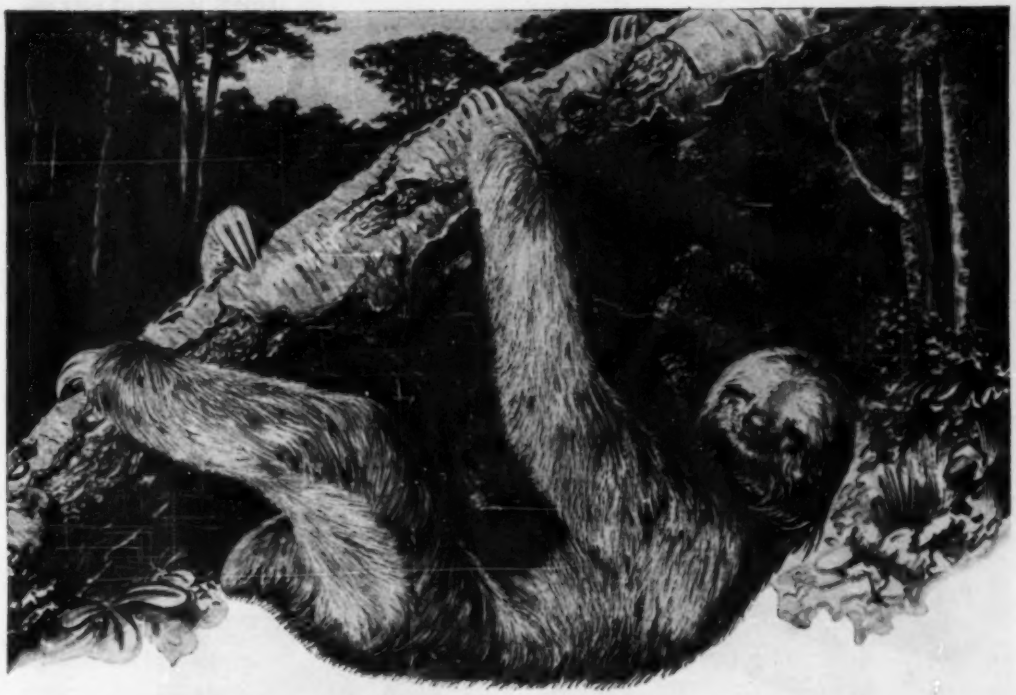

in WIRE ROPE, too load strain calls for SPECIALIZED muscles

Everything looks upside down to the three-toed sloth. Unique among animals, he prefers to live his life dangling downward from the top branches of tall trees. Helping him to survive in his topsy-turvy world are highly specialized and powerfully developed rear and forelimb muscles.

In wire rope, too, specialized jobs call for the right kind of muscle. Load strain! Bending fatigue! Shock stress! Abrasion! Each calls for wire rope that best combines the required resistance characteristics.

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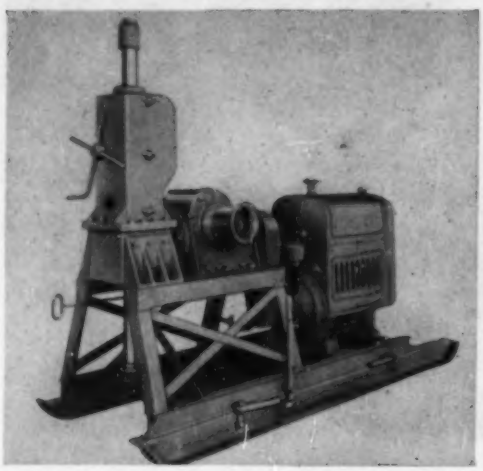


Shot Core Unit Drills Various Materials (1)

New Acker Model KR shot core drill is designed for efficient economical recovery of cores up to 20 in in diameter and depths to 600 ft from any type of formation ranging from sand to granite. The entire unit can be mounted on a skid, trailer or truck and driven by power take-off or separate motor of various types. Since the shot bits are run to destruction and bit maintenance is negligible, operation is unusually economical, particularly with cores of 3 in and larger, the maker reports. In operation, shot is carried automatically down through the drill rod directly to the cutting bit and drill cuttings are flushed to the surface. Drill operation requires no particular skill and instant control of the three drilling speeds is provided, it is said. Model KR also is especially suited to drilling tube and artesian wells and for recovering cores from large masonry or concrete areas, including those with steel reinforcement bars. Bulletin 19 offering full details is available from the *Acker Drill Co., Inc., Scranton 3, Pa.*

Tungsten-Carbide Coatings and New-Type Chrome-Carbide Developed (2)

A "weldable" tungsten carbide that can be used to "coat" metal parts with a skin 1/16 to ¼ in thick has been announced by the Carboloy Dept. of General Electric as a part of its large-scale expansion into new products and metallurgical materials. Still in the "engineering appraisal" stage, the product is said to fuse and blend with the base metal when flowed onto metals such as steel or iron and provides a surface coating of about 70% wear-resisting tungsten carbide. Applied with conventional shielded electric arc welding equipment, the new product appears to be most suited for wear-proofing of parts where use of solid carbide sections is inconvenient. Also announced for full production is a new Series 600 "chrome-carbide" which offers extremely high resistance to abrasion, erosion and corrosion, lighter weight, thermal expansion similar to that of steels and extreme resistance to oxidation at even high temperatures. Expected to eliminate the need for costly and strategic tungsten and cobalt. Series 600 will not supplant tungsten carbide though it may be used for some of its applications. It will be available initially in the complete size and shape range offered in tungsten carbide and can be brazed and attached by mechanical means. It is expected to be used generally for complete parts instead of tipping. Full data from the *Carboloy Dept., General Electric Co., Detroit 32.*

New Trucks Offer More Power, Less Weight For Larger Pay Load Capacity (3)

The new Federal 3400 Series Style Liner models are designed for high power output and comparatively low chassis weight to assure faster operating schedules and bigger payload capacity to meet increasing highway-load restrictions, which are features of special interest to tractor operators, the maker says. The new series consists of three models, with eight wheelbase lengths from 136 to 250 in, gross vehicle weights from 23,000 to 25,000 lb and tractor-trailer ratings up to 45,000 lb. The units are powered by Federal's new "Power Chief" 145-hp 6-cylinder valve-in-head gasoline engine which is said to have been engineered to provide increased power output and peak fuel economy under all operating conditions. The 3400 Series also include the numerous engine, body and chassis features characteristic of the Style Liner models. Full data from the *Federal Motor Truck Co., Detroit 9.*

Training Carrier Keeps Belt In Line (4)

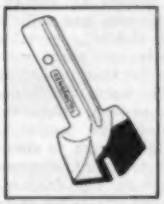
New belt-training carrier, said to require installation on most applications only at intervals of 50 to 100 ft, features "training rollers" that respond instantaneously to any shift of the belt off dead center and tilt the carrier into an angular position with respect to the direction of belt travel, which quickly returns the belt to center so that the carrier resumes its normal position. Edge wear of the belt

Service Engineer Helps Improve Cutting in Customer's Mine

Kennametal representative Max J. Caylor, of Mars, Pa., after selling a set of Kennametal U-8 Machine Bits, went into the mine to watch them in operation. He was able to suggest a change in the operating technique for the cutting machine. Some months later, the Mine Electrician stated that they were saving enough on feed ropes, friction parts, and controller parts to pay for the Kennametal Bits they were using.

●

Special Bit for Hard Roof



Kennametal Bit, Style HFD, makes rotary drilling feasible in slate, shale, and laminated sandstone. Its cutting edges are Kennametal cemented carbide, thickened to resist shock, and lengthened for greater resistance to gage loss. The bit fits in a special inexpensive Bolting Rod (hollow drill rod, where water is used). Ordinary coal drills, or special roof bolting rotary drills, are used to power the bit. Fast drilling speeds are given and low cost drilling results. Bits are $5.70 to $6.95 each.

●

Low Cost Coal Bit

Low cost drilling is given by the Kennametal Style D Coal Bit because of its long drilling life and fast speed. It drills most rock encountered in the seam at a fast speed, without causing drills to overheat. Special features: (1) Kennametal cemented carbide tips, (2) Better balance between speed and bit life, (3) More efficient cutting action due to "rake angle" of tip, slope of insert, and prong clearance.

New "UR Series" Kennametal Machine Bits

For faster cutting where shock conditions are severe, such as in the Continuous Miner, and in seams with large amounts of rock and other hard impurities

The new Kennametal UR Series Mining Machine Bits are designed for use where cutting conditions are extremely severe. Like all Kennametal Bits, the UR Series features a cutting edge of high quality Kennametal Tungsten Carbide — the material that resists wear and shock better than any other carbide.

The deep, inserted Kennametal tip is held firmly on 4 surfaces. Because it keeps cutting, even under the severest shocks of tearing and ripping action, the Kennametal UR Bit is the most efficient bit you can use in a continuous miner, or for cutting seams containing rock and similar impurities. Because the Kennametal Tungsten Carbide tip is both hard *and* tough, users get more cutting per shift, with less down time and fewer resharpenings.

Kennametal UR Bits, used in both continuous and regular type mining machines, are already reducing cutting costs in a variety of rugged, rock-laminated seams. Your Kennametal representative will give you the performance story, and he will be glad to demonstrate them on a tough cutting job in your mine. Contact him today! Kennametal Inc., Latrobe, Pa.

Names of Kennametal Representatives appear in the McGraw-Hill Mining Catalogs

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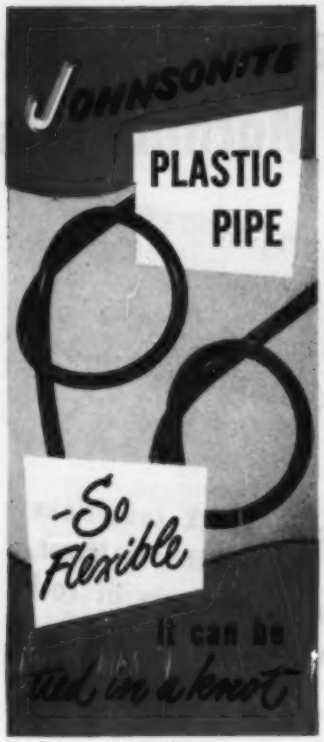

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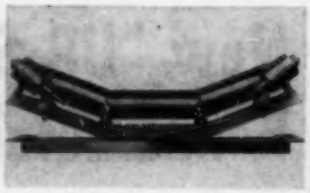
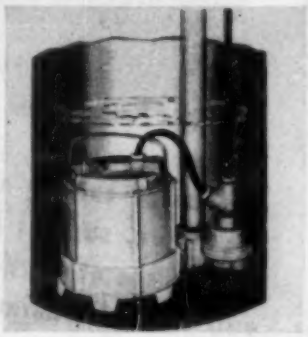


is negligible with the carrier, and its use insures against possibility of serious belt damage due to improper training, it is reported. Bulletin 2-C, giving full details on this and other belt-conveyor carriers is available from *Stephens-Adamson Mfg. Co., Aurora, Ill.*



Portable Utility Pump Fully Submersible (5)

New Kenco completely submersible utility pump features the patented Kenco automatic liquid-level control switch, which eliminates the need for a float, has no moving parts exposed to water and cannot be fouled by water, silt or other debris, the maker says. Measuring 9½ in high and 13 in diameter, the unit weighs only 50 lb and is readily portable and quickly installed for either sump or special drainage applications. It has a capacity of 3,300 gph and is driven by a 1/3-hp motor hermetically sealed in oil and requiring no maintenance. Model P-109MA is both manual and automatic, provided with a through-cord switch which permits manual starting at any depth of water and subsequent automatic operation. *Kenco, Inc., Lorain, Ohio.*

New-Type Splice For Steel-Cable Belt (6)

A new method of splicing steel-cable conveyor belting, developed and patented by Goodrich, is said to place all cables under equal tension during vulcanization so that each cable carries its share of the load in the finished splice. The new method also permits the straightest possible splice, resulting in belts that track straight and true for economical trouble-free operation, it is reported. The only special tools required for the tensioned splice, which can be made in the field as well as at the factory, are a crimping device for squeezing the connectors to anchor the cable ends, and a special scraping tool to remove rubber from the cables. More details from *B. F. Goodrich Co., Akron, Ohio.*

Electronic Tester Locates Insulation Faults (7)

New Westinghouse industrial electronic surge-comparison tester used to locate insulation faults and winding dissymmetries in motors, AC and DC generators, transformers and coils is available in either mobile or portable models and has adequate surge voltage characteristics for most insulation tests, it is said. The tester simultaneously tests turn-to-turn, phase-to-phase, and coil-to-ground insulation with potentials high enough to simulate power-circuit transient stresses. With every test set-up, high-frequency and high-potential qualitative tests of resistance, impedance and turn balance are made and the results are obtained by a single scope observation. Non-destructive testing is assured even on fractional-horsepower motors and generators, and destructive fault location is possible in many cases, the maker reports. Details from *Westinghouse Electric Corp., Pittsburgh 30.*

Mobile Radios Operate In Two Channels (8)

New G-E 25-50-mc mobile radio communications equipment, featuring quandra-tuned IF transformers in the receivers, consists of separate models for operation in either 20- or 40-kc channels, with the wide band equipment convertible to 20-kc operation at extremely low cost, it is said. Five high Q tuned circuits between the antenna and first converter improve reception and reduce interference, the maker reports. Using the 20 db quieting method, the receiver for 20-kc operation has selectivity of 100 db down at plus or minus 20-kc. By the same method the 40-kc receiver has

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★ Three-hundred feet of conveyor—and an intermittent loading of from 50 to 250 full bottle cases, made maintenance, downtime, and repair costs soar in the plant of a Milwaukee bottler.

Since two electric motors fought against each other, a Twin Disc HYDRO-SHEAVE Drive was installed at each power station—installed in a few minutes directly onto the motor shaft, in the normal sheave position.

Ever since, each motor and gear reducer takes its share of an unbalanced load without shock—for all shock is absorbed by the HYDRO-SHEAVES. Motors no longer pull against each other. The HYDRO-SHEAVES, by transmitting the power through fluid, permit a *soft, balanced* drive in which motors can pick up a full load cleanly, without jerking or stalling to eliminate entirely many of the reasons for costly operation.

Two electric motors are balanced, shock loads are cushioned out in the plant of a Milwaukee bottler with Twin Disc HYDRO-SHEAVE Drives.

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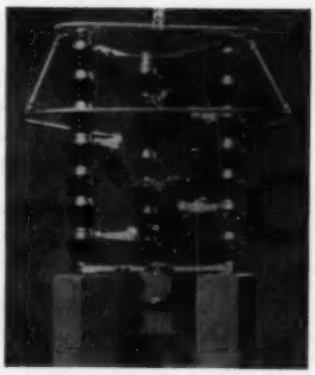
selectivity of 100 db down at plus or minus 30-kc. Detailed data from *General Electric Co., Syracuse, N. Y.*

Heavy-Duty Master Switch Has Lightweight Cover (9)

A redesigned G-E master switch, featuring a new cast-aluminum cover and up to five adjustable stops, is built for heavy-duty installations on large materials-handling equipment. The new aluminum cover offers good protection for the switch interior from dust, dirt, and accidental blows, according to G-E engineers. Weighing only one-third as much as the previously used cast-iron cover, it is easy to remove for inspection and normal servicing of the switch interior. Adjustable stops on the switch provide for any combination of from one to five points of movement of the operating handle in either clockwise or counter-clockwise direction. The new switch is fully interchangeable with former G-E types in size, mounting and all wearing parts, simplifying parts replacement—*General Electric Co., Control Dept., Schenectady 5, N. Y.*



Self-Supporting Arrester For Low Height (10)

New Westinghouse low-height station-type self-supporting arrester

varying in ratings from 195 through 242 kv, is designed to eliminate the expense of supporting structure and bracing insulators. Utilizing a spiral staircase pattern, the assembly is built for protection of equipment where space limitation is critical. A complete single-pole arrester consists of a series of Type SV arrester units mounted spirally between supporting columns of standard apparatus insulators, which is said to considerably reduce the height of the arrester, providing additional head room and cutting assembly and maintenance time to a minimum.—*Westinghouse Electric Corp., Pittsburgh 30.*

Air Compressor Hauled At High Speeds (11)

New Jaeger Standard Model 365 air compressor, rated at 365 cu ft of air per minute at 100 psi, utilizes a 165-

hp Model HRBI-600 Cummins diesel engine. Both the diesel engine and compressor are mounted on structurally welded main frames. The heavy-duty wagon has an "autosteer" front axle, and can be hauled safely at 35 mph over rough roads, it is said. Steel wheels or skid mountings also are available. More details from *Jaeger Machine Co., Columbus, Ohio.*

Equipment Shorts You'll Want to Check

(12) CONCRETE DENSIFIER, called "Heat-Crete," is said by the maker to increase thermal conductivity of concrete to provide better heat distribution in radiant heating and also to improve the wearing qualities, strength and structure of concrete while reducing the water needed. It also provides a glaze-like finish for concrete and other plastic masses. Folder with full details available from *Lee-Don, Inc., Harmarville, Pa.*

(13) TO REMIND TRUCK DRIVERS that maximum horsepower is available only at the governed speed of the engine, new special tachometer dial faces for Cummins units shows available horsepower as well as engine rpm at all times. The tachometer face is expected to help drivers prevent lugging, which causes valve and injection troubles that prevent an engine from delivering its full horsepower. It is available for six models from *Cummins Engine Co., Inc., Columbus, Ind.*

(14) BACK RIPPERS now available for angling-blade bulldozers are welded to the underside of the C frame to save operating time by loosening

material on the backward motion. The teeth float on top of the ground when the tractor goes forward and automatically dig and rip as it moves back. Teeth can be locked out of way when desired.—*Preco, Inc., Los Angeles 22.*

(15) SINGLE-POLE OIL SWITCH, the new Westinghouse Type CSO-1, was developed primarily for control of small banks of pole-mounted capacitors and is well suited to large-area and street lighting, it is said. It can be operated manually or electrically by an automatic control device, and can be ganged for three-pole switching. Operating coils are interchangeable and provide 110-, 220- and 440-v control. Full data from *Westinghouse Electric Corp., Pittsburgh 30.*

(16) NEW ROCK-TYPE TIRE is designed particularly for graders, special tractors and motor patrols operating where there is considerable rock or under unusually tough conditions where cutting of the casing is a major problem. Made for semi-drop rims, the tire fits rim size 800 T, has a cross section 13.2 in wide, an outside diameter of 50.8 in and a maximum rated load of 6,600 lb when inflated to 50-lb pressure. Full details from *B. F. Goodrich Co., Akron, Ohio.*

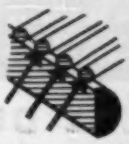
(17) FOR PAINTING LARGE AREAS FROM A STANDING POSI-

FASTER, BETTER DEWATERING

BEE-ZEE
ROUND ROD SCREENS

Make more money by stopping winter freeze-ups. When you use Bee-Zee Round Rod Screens water leaves coal faster — gives you drier coal easier to handle in winter cold.

FINE POINT OF CONTACT

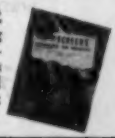


between round top and tie rods leaves no "pockets" to cause blinding or clogging. Water is removed quickly and thoroughly. Special alloy stainless steel resists rust, wear and corrosion.

BEE-ZEE ROUND ROD DESIGN

means that top rods can wear *half-way* through their diameters before screen opening changes in size. Coal men say Bee-Zee Screens last 10, 20 — even 30 times longer.

WRITE FOR FREE CATALOG explaining all the features of Bee-Zee Round Rod Screens and their use in coal processing work. No cost or obligation.



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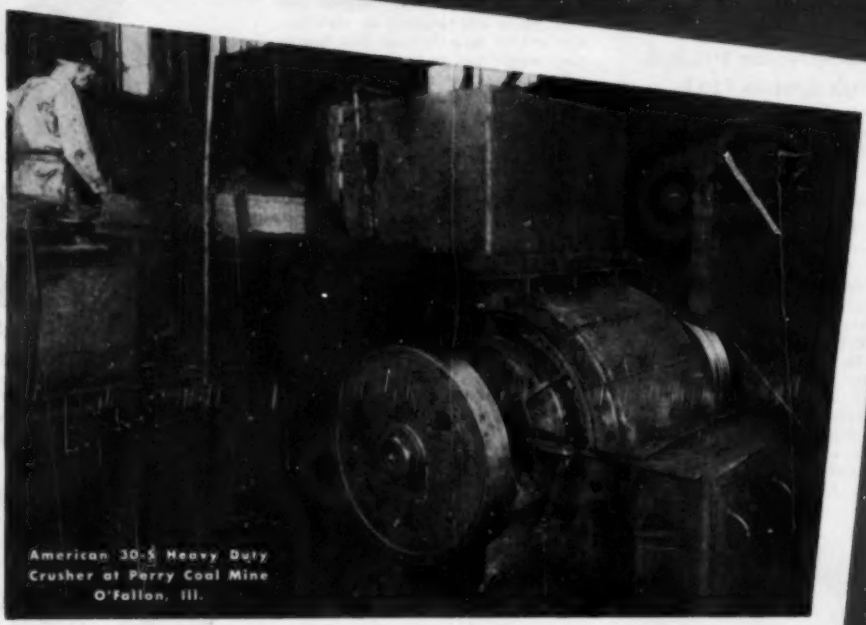
ENGINEERING COMPANY

Bee-Zee Screens can be fitted to any coal processing equipment.
1120 ABINGDON ST. GALESBURG, ILL.

CASE HISTORY No. 12

"CRUSHING" FACTS on American Crusher PERFORMANCE

(Taken From An Independent Survey)



American 30-S Heavy Duty Crusher at Perry Coal Mine O'Fallon, Ill.

HEAVY DUTY *American* CRUSHER CUTS COSTS 66%!

Prior to the installation of this heavy-duty American Rolling Ring Crusher at the Perry Coal Mine in O'Fallon, Illinois, three men were stationed at the picking table—removing rock, slate, sulphur balls and foreign material that were either too large or too hard to reduce in the single roll crusher then in use.

Since the American installation, only one man is needed . . . this heavy-duty machine is tough enough to handle any size ROM coal hoisted, as well as rock impurities. Installed May, 1950, this American Crusher shows *no sign of wear*—even though all plus 7" coal and refuse from a 1,000,000-tons-a-year mine passes through it.

WRITE FOR FREE COAL BULLETIN

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE., ST. LOUIS 10, MO.

TION on the floor, thus cutting down safety hazards with ladders and scaffolds and saving painting time, Arsco heavy duty rollers have a 4-ft handle and can readily be attached to longer handles. The units work with all types of paints and come in three sizes, 9, 14 and 18 in.—*The American Products Co., New York 66.*

(18) WEAR-RESISTANT FLOORS that are said to outlast concrete by 3:1, AWOG floors reportedly provide a smooth case-hardened dustless surface that will resist acid, water, oil and grease. It can be used for repairing broken areas or for complete new floors. Trial order plan and descriptive folder from *Flexrock Co., Philadelphia 4.*

(19) FOR PAYROLL DEDUCTIONS under the new income tax law, Delbridge Social Security and Withholding Tax Chart has been revised to provide precalculated figures for necessary deductions. It is available for weekly, biweekly, semimonthly and monthly payrolls, at $3.50 each, from *Delbridge Calculating Systems, Inc., St. Louis 17.*

(20) VISUAL PRESENTATION of both ideas and facts and figures is easier, quicker and more effective with a new system of "Magnetic Visual Aids," the maker says. The new magnetic devices can be adapted to visual planning, production and inventory control, scheduling, training, organization planning and map control, etc. Literature from *Magnetic Merchandising, Inc., New York 16.*

(21) NEW WELDER'S GOGGLE, featuring removable and adjustable binder-type side shields of soft leather, is easily adjusted for perfect fit to provide greater comfort and increased protection against heat, harmful light and flying particles, the maker reports. Full data on the New Series 5081A goggle from *American Optical Co., Southbridge, Mass.*

(22) BELT-TYPE FIRST-AID KIT, used for civilian defense in World War II, now is again being made available by the maker for industrial-plant and municipal defense activities. Full details from *Mine Safety Appliances Co., Pittsburgh 8.*

(23) MULTI-PURPOSE INDUSTRIAL-TYPE HOSE, known as "Abrasoflex," is said by the maker to be oil- and abrasion-resistant and to be usable for air, welding, cold and hot water, paint and oil spraying, grease and gasoline handling. Available in seven sizes up to 1 in, Abrasoflex will simplify stocking of hose required for a variety of applications, it is said. —*Mercer Rubber Corp., New York.*

(24) PLASTIC GOGGLE designed for general-purpose protection offers wide-angle vision and may be worn over prescription glasses. Weighing only 1½ oz, the goggle is made in one piece with a molded rubber binding. Trial order or more data from *General Scientific Equipment Co., Philadelphia 22.*

EQUIPMENT BULLETINS AVAILABLE

(25) BELT-CONVEYOR CARRIERS —20-p Bulletin 2-C offered by Stephens-Adamson Mfg. Co., Aurora, Ill., provides detailed data on the construction, features and sizes of the complete line of S-A belt-conveyor carriers, return and guide rollers.

(26) WHAT YOU SHOULD KNOW about modern fire-fighting devices and the different fire-extinguishing agents used in them is contained in a new 32-p illustrated booklet titled "Correct Fire Protection," published by the American - LaFrance - Foamite Corp., Elmira, N. Y. It explains the correct fire extinguisher for use on various kinds of fires and it also illustrates and describes the sizes of units available for use with the different kinds of fire-extinguishing agents.

(27) ELECTRIC MOTORS — A-C Type APZ totally-enclosed fan-cooled motors, as well as the non-ventilated Type APK, are fully described in a new Bulletin 51B7285 released by Allis-Chalmers Mfg. Co., Milwaukee 1. Because of the elimination of internal air passages and dirt-catching pockets, the motor is easy to keep clean, which together with an efficient cooling system, makes it suitable for use where there is dust, dirt, fly-ash, rain, snow or corrosive gases, it is said.

(28) EXCAVATOR — Koehring Co., Milwaukee 16, offers a new catalog covering design, construction, work capacity and application of its Model 304 unit rated as a ¾-yd excavator, which combines a ¾-yd dipper with a 25-ton lift crane capacity on truck or cruiser mounting and 13.9-ton capacity on crawlers; available with a complete complement of attachments.

(29) MATERIALS - HANDLING — Varied bulk-material-handling applications of Hough Payloader tractor-shovels in many different kinds of plants and jobs, together with job studies and performance data, are covered in Catalog 205 available from The Frank G. Hough Co., Libertyville, Ill.

(30) COAL AND ASH-HANDLING EQUIPMENT for power plants is

CARD USERS NOTE—Please be sure to give your name, position and company to insure proper handling of your request. Since some cards have been received without names, we would be glad to have you check us if you have no response to your request within a reasonable time.

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THE EDITOR, COAL AGE

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thoroughly discussed and illustrated in 44-p Book 2410 published by Link-Belt Co., Chicago 1. The booklet includes installations at both large and small public utility, industrial and public-building power plants. Sections are devoted to unloading coal, auxiliary unloading, coal storage and reclaiming, crushers, transporting and distributing equipment, ash handling and water-intake screens.

(31) CABLE—Folder from Rockbestos Products Corp., New Haven 4, Conn., shows how to save critical copper and steel and reduce installation time with Rockbestos AVC cable, said to offer greater current-carrying capacity.

(32) ELECTRIC MOTORS—Bulletin MV-94 from the Wagner Electric Corp., St. Louis 14, provides data on the Wagner line of electric motors, with details of types, characteristics, ratings and suggested applications.

(33) AIR-HANDLING, air-conditioning and air-cleaning equipment is described in considerable detail in a new 16-p condensed catalog of the full Westinghouse Sturtevant line. Included are data on operation, features specifications and capacities. Booklet B-5164 is available from Dept T, Sturtevant Div., Westinghouse Electric Corp., Boston 26, Mass.

(34) PLANNED LUBRICATION — Bulletin BK-19 gives full details on seven Keystone specialized lubricants said to cover the majority of plant requirements with a minimum of different types and densities. Discussed in the 20-p booklet are lubricants for ball and roller bearings, plain and ring bearings, open gears, enclosed gears and speed reducers, and oils for cleaning, loosening and penetrating. Available from Keystone Lubricating Co., Philadelphia 32.

(35) PUMPS—Bulletin W-317-B12 on Freeflo pumps for sump, sewage and drainage service, offered by Worthington Pump & Machinery Corp., Harrison, N. J., describes the FLJ and FLJD wet-pit pumps featuring nonclogging sewage-pump impellers capable of passing solids and stringy material.

(36) CONVEYOR BELTING — Ray-Man "F," a general-purpose heavy-duty conveyor belt recently developed with an engineered strength member said to offer several important advantages over conventional duck belts, is described in Bulletin 6915 available from Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.

(37) CRUSHERS — Booklet entitled "Crushing in the Aluminum Industry," illustrates the applications of Pennsylvania crushers to the various problems of aluminum making and charts the entire process of bauxite refining from ore to alumina. Available from the Pennsylvania Crusher Co., Div. of Bath Iron Works, Philadelphia 7.

(38) V-BELTS—Bulletin 6868-E describing the "Precision Balanced" and "More Grip, Less Slip" features built into its improved Condor V-belts has been issued by Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J. Included are examples of interesting installations, standard industrial sizes and list prices.

(39) VERTICAL PROPELLER PUMPS for flood control, drainage, irrigation and similar low-head service are covered in Bulletin W-314-B2 offered by the Worthington Pump & Machinery Corp., Harrison, N. J. Operating details, dimensions and clearances are provided.

(40) FOR FASTER AND EASIER MOVING of materials and supplies, condensed Catalog 508-B contains specifications and illustrations for the complete line of the latest Howe 2- and 4-wheel hand trucks, trailer trucks, baggage wagons, platform skids, dollies, lift-jack systems, wheels, casters and molded-on rubber-tired wheels. Available from the Howe Scale Co., Rutland, Vt.

(41) PACKAGE PUMPS—A-C package pumps engineered for a wide range of fractional-horsepower applications, including air conditioning, in capacities to 80 gpm at heads to 100 ft are described in Bulletin 52B7529 released by Allis-Chalmers Mfg. Co., Milwaukee 1. The pump unit is available in four different types, open and closed impeller close-coupled, pedestal-mounted, and open impeller vertical-mounting type.

(42) AUTOMATIC WELDING—Catalog ADC 717 available from Air Reduction Sales Co., New York 17, describes the Aircomatic gun for manual operation, the Aircomatic head for automatic operation and Aircomatic wires for use with either manual or automatic equipment, together with a few of the many possible applications.

(43) FORK TRUCK—Bulletin 1327, released by Baker Industrial Truck Div., The Baker-Raulang Co., Cleveland 2, shows you all the important construction and operating features of the new Baker Type FS 2,000-lb fork truck. Also covered are the numerous special attachments available to make a variety of handling jobs up to 2,000 lb easier and more economical.

(45) WELDING RODS — Victor Equipment Co., Alloy Rod & Metal Div., Los Angeles, offers five new bulletins covering its complete line of hard-facing alloy rods for electric or acetylene applications. Properties, typical applications, sizes and methods of use are discussed.

(46) WELDING ACCESSORIES — Catalog EN-16[illegible]S offered by Hobart Bros. Co., Troy, Ohio, covers the complete line of Hobart arc-welding accessories and supplies

(47) GENERAL-PURPOSE PUMPS —Bulletin 52B6351B offered by Allis Chalmers Mfg. Co., Milwaukee 1, provides full construction and operating details on the Type SSB grease-lubricated pedestal-mounted general-purpose pumps available in capacities up to 2,500 gpm at heads to 550 ft, with stuffing box or mechanical seal, direct-coupling or V-belt drive and in a choice of materials.

(48) AIR VIBRATORS for application on bins, hoppers, chutes and other installations are covered in Catalog 106 available from the Cleveland Vibrator Co., Cleveland 13. Sizes, dimensions and typical installations are included.

(49) STEEL-SERVICING FACILITIES at its new Cincinnati plant, designed for speedy supplying of steels from stock, are described in a 12-p booklet issued by Joseph T. Ryerson & Son, Inc., Cincinnati 14.

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Coal Washing Pump

ONLY 5 WEARING PARTS

Shaft sleeve, impeller casing, two wear plates. All easy to handle and easy to replace.

EVERYTHING YOU NEED TO REMOVE or adjust when servicing the Allis-Chalmers CW Pump is easy to reach and easy to replace. The packing gland nuts are wide open so you can get a wrench on them. The clear water seal piping is easy to install and the flow is easy to adjust. If you want to remove the rotating element, the casing bolts need only be loosened slightly and pulled out of their slots. Piping is not disturbed.

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Discuss your coal washing equipment problems with an Allis-Chalmers pump engineer. Call your nearby A-C District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 08B6381. A-3331

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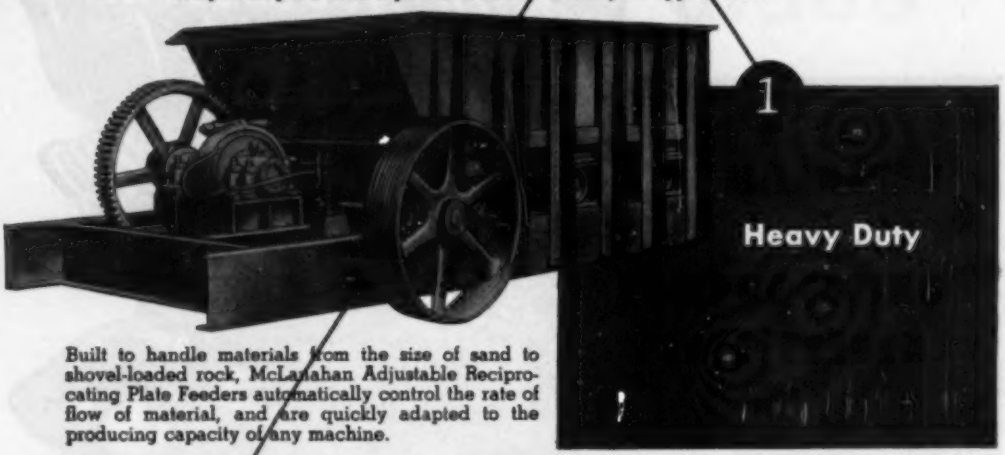
A combination of McLanahan Reciprocating Plate Feeder and Rockmaster Crusher is your answer to most economical feeding and crushing of 1000 tons or more of limestone, ore or rock per hour. Equipment can be furnished as component parts or as separate units to best suit your application.



1

Heavy Duty

Built to handle materials from the size of sand to shovel-loaded rock, McLanahan Adjustable Reciprocating Plate Feeders automatically control the rate of flow of material, and are quickly adapted to the producing capacity of any machine.

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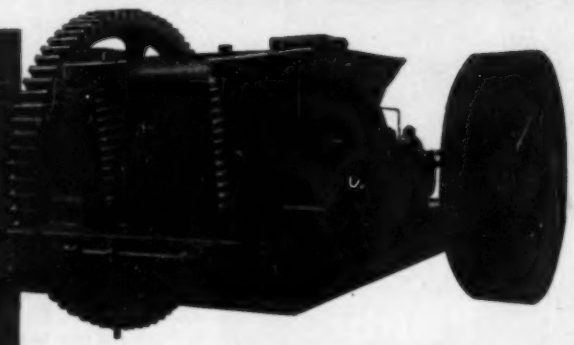

The McLanahan Rockmaster Crusher is the economical solution to most any crushing problems. Greatest savings can be achieved by this combination of equipment. Outstanding for primary and secondary crushing operations, for use on limestone, gypsum, rock, gravel, shale, iron ore, slag and other materials.

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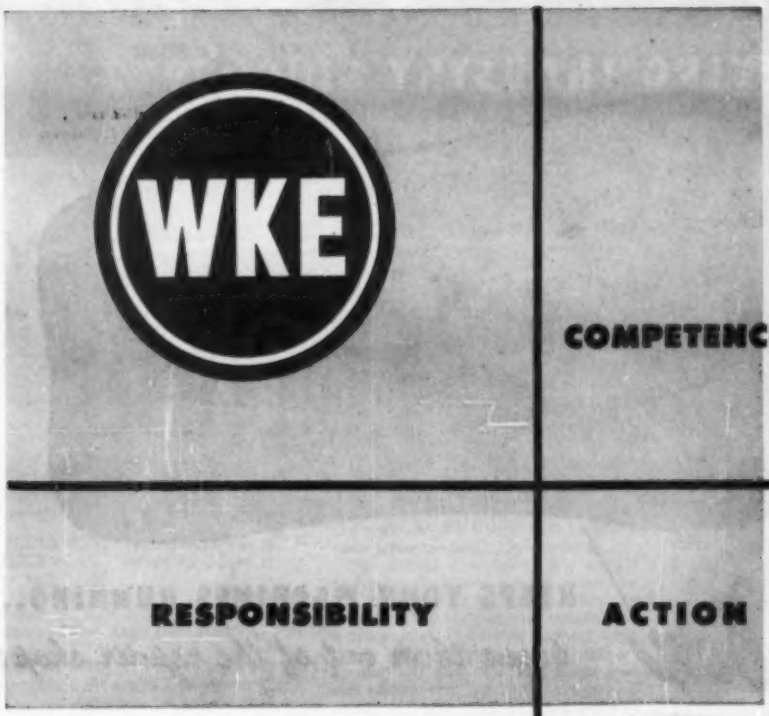

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Repeat orders from customers prove the merit of Trabon. There are more Trabon automatic lubricating systems in operation than all other makes!

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NEWS Round-Up

What's Ahead in the Bureau of Mines

In an exclusive statement, the new director says . . .

The bureau will share in defense tasks

Synthetic liquid fuels will be pushed

New safety goals will be set up

At the request of **Coal Age**, *J. J. Forbes, newly sworn-in director, U. S. Bureau of Mines, released the following statement of policies and plans:*

WHAT ARE THE AIMS AND POLICIES of the Bureau of Mines going to be?

That question is being asked many times of late. It is only fair to assume from the frequency of the question that many people expect a new director, like the new broom in the familiar adage, to sweep clean. Let me state at the outset that the analogy is not a good one. In the first place, although I took the oath of office as director only on last November 15, I am a long-time worker in the Bureau with a record dating back to February, 1915. And in the second place, drastic changes are neither necessary nor desirable.

My 36 yr in the Bureau has afforded me a wide knowledge of the Bureau's people and of its many and diverse activities, other than in my own special field of health and safety, and on the basis of this personal knowledge I can safely assert that here is an agency that merits the respect and esteem of the American people. On its staff are some of the outstanding scientists, engineers and technologists in their respective fields. I have been privileged to observe them, together with their lesser known fellow workers—laboratory technicians, scientific aides, junior metallurgists and the non-professional clerks, typists, mechanics and other workers—carry out their duties with integrity and an admirable sense of devotion to public service.

This does not mean that no changes will be made—but they will be made gradually and according to modifying circumstances, just as any dynamic and progressive agency adapts itself to changing conditions.

The Bureau and Defense

At present we are in the early critical stages of a national mobilization program. The Bureau has been and is playing a useful role in this program. Many of the Bureau programs are currently oriented toward the defense effort and will probably have to be for some time to come.

The critical shortage of key metals and nonmetals necessitates action by the Bureau to facilitate expansion by domestic industry of its capacity to produce such metals as copper, lead, zinc, aluminum, iron ore and various ferroalloys; such fuels as coking coal and petroleum, as well as benzol, toluol and other fuel byproducts; and such nonmetallic commodities as asbestos, fluorospar, mica and steatite. The Bureau is working closely with related defense agencies, as well as carrying on numerous cooperative projects with the armed services, the Atomic Energy Commission and similar organizations, both private and governmental. These cooperative endeavors in the part of the Bureau take the form of joint research projects, the supplying of engineering services, the making of economic studies, or providing basic technologic and statistical data on the mineral industries.

Finding Minerals and Fuels

Characteristic of the type of work now being emphasized by the Bureau, which it probably will have to continue to emphasize for some time to come, are the following:

Mineral exploration—The rapid expansion in output of most domestic

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JOHN J. FORBES, a USBM career man widely known throughout the coal industry, was named director of the U. S. Bureau of Mines by President Truman Nov. 10. Mr. Forbes, who has been chief of the Bureau's Health and Safety Div. since 1948, received a recess appointment, but it is expected that his permanent appointment will be submitted for Senate confirmation when Congress reconvenes in January.

Unlike his predecessor, Dr. James Boyd, whose confirmation was held up from 1947 to 1949 by the opposition of John L. Lewis, Mr. Forbes was strongly endorsed by Thomas Kennedy, UMWA vice president; an official spokesman in the UMWA Washington office, and several UMWA district officials.

Mr. Forbes was born in Shamokin, Pa., and entered the mines at an early age as a breaker boy. He attended the Kutztown (Pa.) State Teachers College and obtained a degree in mining engineering from Penn State College. After teaching for a few years, he joined the Bureau in 1915 as a probational first-aid miner in Pittsburgh. He held various positions with the Bureau, including that of chief engineer of the Safety Extension Service and chief inspector of the Coal Mine Inspection Div.

metals and minerals, necessitated by our growing defense effort, is bound to result in greater depletion of our Nation's resources. It follows, therefore, that discovery and development of new or improved deposits are essential to the maintenance of our future industrial economy. The government, acting through the Department of the Interior under the Defense Production Act, is engaged in a broad program of encouraging mineral exploration and development of domestic mineral deposits by private industry. As is well known by now, the government is contributing from 50 to 90% of the costs of conducting feasible projects, the percentages varying according to the strategic importance of the several minerals and the inherent difficulties in finding them and bringing the deposits into production. The Bureau has virtually recessed the type of exploration it has conducted on its own during the war and postwar years in order to throw its skilled and experienced groups of mining engineers into this new program. Other worthwhile mining research and investigating projects also have been postponed in order to concentrate on this broad exploration program during the current emergency.

Synthetic fuels—The pressing need for an insured supply of liquid fuels and strategic chemical products for our Nation imposes on the Bureau the necessity of pursuing with diligence its work on shale-oil production, coal hydrogenation and related synthetic liquid fuels research and development. Since 1944, when the Bureau started on this work on a relatively large scale, much progress has been made. At Rifle, Colo., low-cost mining methods have been developed and a small (200 bbl per day) refinery is now producing shale oil and turning out acceptable petroleum products. At Morgantown, W. Va., a pilot-plant gasifier is producing pure synthesis gas and hydrogen from coal for coal hydrogenation. At Louisiana, Mo., the Bureau's demonstration plant is producing by coal hydrogenation satisfactory gasoline from various grades of coal. And a small plant in the same location is turning out gasoline and other liquid fuels from coal by a gas-synthesis process. At the same time, small-scale experiments and extensive research are being carried on in laboratories at Laramie, Wyo., and Bruceton, Pa.

Secretary of the Interior Oscar L. Chapman has expressed the belief that the time is ripe for the establishment, by private industry, of plants employing the coal hydrogenation process to pave the way for larger production of liquid fuels and critically needed chemicals. No specific project has been endorsed by him nor, I am certain, would he recommend or endorse any project unless he has carefully determined in advance that it is technically sound, reasonable and in the national interest. Regardless of whether or not large-scale plants are constructed and placed in operation at some time in the future, the research, development and demonstration phases of the Bureau's work must continue so that an ample supply of liquid fuels which are so essential to our national security may be assured.

Metallurgical research on manganese—The demand for manganese for steel-making increases year by year as steel capacity keeps growing, yet our own domestic resources supply something like 10% of our needs. Once, a major source of supply was the Soviet Union, but now we are primarily dependent on other foreign sources. Yet here at home we have large deposits of this essential metal. Unfortunately, the ores are lowgrade or complex and uneconomic at present to mine and beneficiate. The Bureau, therefore, with the approval of the Congress, has undertaken a large-scale intensified research program on the ores of certain deposits of magnitude, in the hope that feasible and reasonable methods can be worked out to utilize them. In addition, the possibility that suitable recoveries of maganese can be obtained from the slag dumps of steel mills is being thoroughly investigated.

The foregoing are only three examples of the type of work which are emphasized today because of the critical times. I should mention perhaps that work in new fields, such as the production of ductile titanium and zirconium, falls within the province of the Bureau and such endeavors also have received impetus recently because of the mobilization effort.

Thus the work of the Bureau is constantly oriented toward the needs of the era through which we as a Nation are passing, but at the same time fundamental investigation and other important projects are continued with a view to the long-term needs of the Nation. In accordance with the Organic Act of the Bureau, this agency of government as a servant of all the people must look ahead beyond the next one, two or five years. It must also think in terms of the welfare of future generations of America.

Improving Safety Work

The safety and health of the men and women in the mineral industries, a subject which has been close to my heart for longer than my 36 yr in the Bureau, will remain a deep concern of the Bureau as long as a single worker loses a life or limb. The Bureau will continue its health and accident-prevention work with every means within its authority. It is gratifying that the numbers of men killed and maimed in our mines, mills and smelters, especially our coal mines, have been cut by more than half during the short period of the Bureau's existence. Gratifying as the reductions in accidents, and particularly mine explosions, have been, they are nowhere near the goals we hope and believe we can achieve.

In recent years, our major fatalities—as much as 85% of the total in any one year—have resulted from roof falls and haulage. The Bureau, therefore, has concentrated in the last few years on these two causes. Special sections have been established in the Bureau organization on roof control and haulage, to carry forward broad and intensive educational campaigns bolstered by continuing investigations and experimentation in roof bolting, haulage devices and other mechanical methods that afford promise of greater safety and are practicable to apply. The achievements that are attained will come about, as in the past, only with the cooperation of the mineral industries—mine management, mineworkers, state officials and others who seek with us the common objective.

In conclusion, I want to point out that cooperation, which has been the key to what success we have been able to achieve in our safety work, is the guiding principle in all of the Bureau's endeavors. The Bureau, as an agency of government, has ever had before it a concept of service to the American public. Such authority as it derives from the Congress always has been exercised and will continue to be employed in the broad national interest. Conservation of life and the wise development and use of our mineral resources, the primary duties with which it is entrusted, are vital to the future peace and security of the Nation.

123 Coal Mine Projects Authorized by the DSFA

The Defense Solid Fuels Administration reported Nov. 5 that it had authorized 123 coal-mine construction projects in 11 states, through the first quarter of 1952. Total costs of the projects listed added up to $137,235,595.

While some applications for controlled materials in the first quarter of 1952 have been denied or reduced because of necessary limitations on the allotments of controlled materials to the DSFA made recently by the Defense Production Administration, essential needs for coal-mine construction projects are being met, Charles W. Connor, DSFA administrator, reported. The reductions made constitute only a small percentage of the total requests received, he pointed out. Requested allotments of copper wire, for example, were cut on an average of 10% because of the extremely short supply, he said.

The projects were authorized by the

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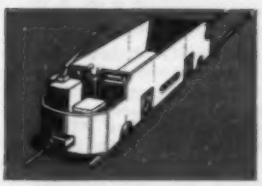
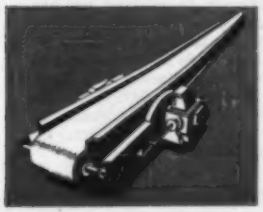
Get Out Scrap—Keep Steel Coming

Staying Power in Mine Equipment

Upped

BY THESE 4 STEPS





1st step: Examine Cities Service lubricants for out-and-out quality through your purchasing experts or test facilities . . . or from service records established by critical users.

2nd step: Look into the completeness of the Cities Service line as an aid to simplified ordering and prompt, steady supply . . . backed by the extensive facilities and intensive cooperation to keep you out of any lubrication "jam".

3rd step: Review mining's most effective lubrication practices by consulting that fully informed specialist, the Cities Service Lubrication Engineer.

4th step: Ask for facts about the high character of the Cities Service line and the practical technical assistance now upping mine machinery staying power for many of the "hardest drivers". Phone or write CITIES SERVICE OIL COMPANY, Room 239, Sixty Wall Tower, New York City 5. Or get in touch with the Cities Service office nearest you.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

DSFA under the NPA Delegation 14, which provides that applications for authority to begin or continue construction for the production, preparation or processing of solid fuels, and for the allotment of controlled materials, should be made to the DSFA on Form CMP-4 C. The applications are evaluated by the DSFA basically on the necessity for the facility, Mr. Connor stated, although particular attention also is given to assuring the use of minimum quantities of controlled materials. Applicants whose allotments have been denied or reduced can refile for subsequent quarters if they desire. Applications for the second quarter of 1952 must be postmarked by Jan. 15, 1952, and those for the third quarter by April 15, 1952.

Personal Notes

The appointment of successors to Armstrong R. Matthews to head several of its operating subsidiaries has been announced by the Pittston Co. **J. M. Miller**, president of the Raleigh Smokeless Fuel Co., Beckley, W. Va., was named to also head the E. C. Minter Coal Co., Lillybrook Coal Co. and Amigo Smokeless Coal Co. **H. C. Pridham**, vice president in charge of sales for the Davis Coal & Coke Co., was elected president of that company. **Stephen Canonico**, formerly general manager, was made president of the Compass Coal Co. **R. H. Hughes**, chief engineer, was elected a vice president of the Clinchfield Coal Corp., but selection of a president of that company to succeed Mr. Matthews was yet to be announced.

Gilbert S. Meem, formerly executive vice president, has been elected president of the Meem-Haskins Coal Corp., with offices in Bluefield, W. Va. **M. A. Emmons**, general manager, has been elected executive vice president to succeed Mr. Meem, with offices at Kodak, Ky.

A. G. Gossard, general superintendent of the Union Colliery Co., DuQuoin, Ill., has resigned to become vice president and general manager of the Snow Hill Coal Corp., Terre Haute, Ind., effective Nov. 15. Previous to joining Union Colliery 4 yr ago, Mr. Gossard was a mine superintendent for the Pittsburgh Coal Co. A graduate of the University of Illinois School of Engineering, Mr. Gossard also served as a night engineer with the Midland Coal Co. while attending school.

John L. Wright, for the past 29 yr general superintendent of mines for the Stearns Coal & Lumber Co., Stearns, Ky., retired Nov. 1. Mr. Wright joined the company in 1913 as a mule driver and after holding several other jobs was made mine foreman the following year. In 1918 he was promoted to the superintendency of Mine A and 4 yr later was made general superintendent. **Maurice Blevins**, assistant general superintendent since 1943, has succeeded Mr. Wright as general superintendent of mines. Mr. Blevins joined the company in 1931 as a general mine foreman. In 1933, he was made superintendent of Mine No. 4, a post he held until his promotion to assistant general superintendent.

Knode Heads Companies

RALPH H. KNODE, senior vice president, was elected Oct. 31 president of the Westmoreland Coal Co. and the Virginia Coal & Iron Co., succeeding E. B. Leisenring, who resigned because of impaired health. Mr. Knode also replaced Mr. Leisenring as chairman of the board of the Stonega Coke & Coal Co., and was succeeded as president of that company by E. P. Humphrey, formerly senior vice president. Mr. Humphrey, who also is a vice president of Westmoreland Coal and Virginia Coal & Iron, was elected a director of the three companies. Mr. Leisenring will continue as a director and chairman of the executive committee of the companies.

Clark and Chesney in New P.&R. Posts

THE APPOINTMENT of George J. Clark (left) as general manager of the Philadelphia & Reading Coal & Iron Co., was announced last month, effective Nov. 1, along with a number of changes in operating personnel reported elsewhere in this section. Mr. Clark was succeeded as president of the Shan-Penn Production Co. and Wadesville Production Co., P.&R. subsidiaries, by Francis W. Chesney (right), superintendent of P.&R.'s Ashland Div.

Louis C. Fyock has been appointed superintendent of Logan Nos. 3 and 4 mines of the Johnstown Coal & Coke Co., Beaverdale, Pa. Before joining Johnstown Coal & Coke, Mr. Fyock was superintendent of Eureka Mines Nos. 37 and 40, Berwind-White Coal Mining Co., Windber, Pa.

The Hudson Coal Co., Scranton, Pa., recently announced the following changes in operating personnel: **Walter S. Lutz** has been made assistant mining engineer, succeeding **William W. Wirth**, named real estate agent. **Henry W. Brandt Jr.**, has been named machine-mining supervisor, replacing **George Robinson**, transferred, and has been succeeded by **Darius H. Thomas** as ventilation supervisor. **William B Roth** has been made inside foreman at Marvine colliery, replacing **John Davison**, who has retired. Mr. Roth has been succeeded as inside foreman at Birdseye, Eddy Creek colliery, by **George L. Robinson**.

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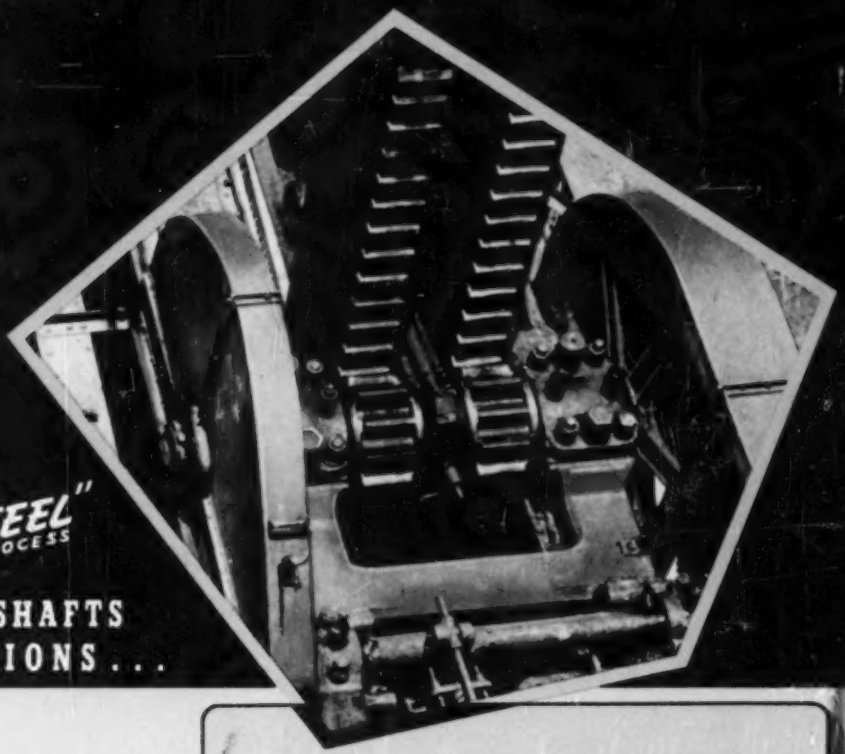
Protect Your Steel With Scrap



"TOOL STEEL" PROCESS

SHIPPER SHAFTS AND PINIONS...

Provide

DELTA COLLIERIES

division of AYRSHIRE with LONGER LIFE! LOWER MAINTENANCE!

"Tool Steel" splined shipper shaft pinions have outlasted competitive pinions by at least 2 to 1 in the same service!

The "Tool Steel" shaft itself is still in good operating condition and indications are that it will finally show the same outstanding performance.

"Tool Steel" materials supplied on Delta's latest order include not only a shipper shaft and pinions but also the two mating racks.

WE GUARANTEE our products to give sufficient life over any other grade of hardened material operating in the same service to cover any difference in first cost. If our material fails to fulfill this guarantee, we will make good the deficiency in either cash or new material.

THIS GUARANTEE WAS ORIGINATED BY AND IS EXCLUSIVE WITH THE TOOL STEEL GEAR AND PINION CO.

HERE'S DELTA COLLIERIES' COMPARISON:

	"TOOL STEEL" SHIPPER SHAFT PINIONS	COMPETITIVE PINIONS
SERVICE LIFE:	24 Months	12 Months (Maximum)

After **24 months** of continuous service the **"Tool Steel"** splined shipper shaft is still in good operating condition.

The shovel on which these records were established strips an average of 4,200,000 cubic yards per year.

This service life can be equalled by no other products!

Write today for complete information.

The Standard of Quality

for GEARS • PINIONS • SPROCKETS • WHEELS *and other* HARDENED PRODUCTS

THE TOOL STEEL GEAR & PINION CO.

CINCINNATI 16, OHIO, U.S.A.

On the *TOUGH* Jobs Operators know

JALLOY HEAT-TREATED PLATES

J&L STEEL

. . . resist impact, abrasion and corrosion

. . . provide longer service life, lower maintenance costs

Cost-conscious mine operators throughout the industry are cutting maintenance and downtime costs by installing tough J&L Jalloy heat-treated steel plates on their equipment.

They've found that on the tough applications heat-treated Jalloy lasts 4 to 20 times longer than mild steel. The reason—Jalloy has the physical properties to resist the severe impact, abrasion and corrosion of mining operations. It is produced with a yield strength of 160,000 lbs. per sq. in. and a Brinell hardness of 341 to 388. The result—Jalloy saves money by cutting steel requirements, reducing downtime for repairs and replacement, and keeping labor costs for maintenance to a minimum.

Here are some of the applications where mine operators are using heat-treated Jalloy—Dump Truck Bottom Liners, Coal, Rock and Ore Chute Liners, Dipper Stick, Shovel and Drag Bucket Reinforcing. You can get Jalloy in bar form and in plates up to 72″ wide and 20′ long with thicknesses from $\frac{3}{16}$″ to $1\frac{1}{2}$″.

Start finding out more about Jalloy today. Just write to Jones & Laughlin Steel Corporation, 412 Jones & Laughlin Building, Pittsburgh 30, Pa. We'll send you a free copy of our booklet, "For Longer Wear . . . Less Repair!" It will give you more complete information on the properties, heat treating and workability of heat-treated Jalloy, the modern mining and quarrying steel.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PA.

WHAT WILL YOU HAVE IN sprockets?

Bowdil maintains a large stock of replacement sprockets for Goodman, Sullivan, Jeffrey, Oldroyd, Morgan-Gardner and other makes of mining machinery. The Bowdil replacement sprocket line comprises more than one hundred different styles including clutch types, keyed types and various tooth designs from 4 to 13 teeth.

All Bowdil Sprockets are made from special alloy steel, heat-treated for exceptionally hard service.

**A complete list of replacement sprockets carried in stock will be furnished on request.*

BY THE MANUFACTURER OF....

• BOWDIL BITS

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BOWDIL
COAL CUTTING EQUIPMENT
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PERSONAL NOTES—Cont'd

Sam Hulings, for the past 10 yr assistant general mine foreman at the Westland mine of the Pittsburgh Coal Co., Div. of Pittsburgh Consolidation Coal Co., recently was promoted to mine foreman at that mine. **Art Pelkey** recently joined the management force as a supervisor at Westland. At the company's Montour No. 4 mine, **Stanley Urban** and **Herb Fenton** have been appointed assistant foremen.

Ralph E. Jamison and **J. B. Morrow** were honored Oct. 16 at a luncheon held by friends at the Greensburg (Pa.) Polo Club to pay tribute to their many years of service to the Western Pennsylvania Coal Operators' Association and the coal industry. The group of 50 attending included the board of directors and the scale committee of the association and other former and present associates. George H. Love, president of Pittsburgh Consolidation Coal Co., was the main speaker and presented plaques expressing the association's gratitude to the honored guests. G. A. Shoemaker, vice president of Pittsburgh Consol, presided.

Barnard Now Vice President

VERNON M. BARNARD last month was elected vice president in charge of operations for the Lillybrook Coal Co., E. C. Minter Coal Co., and Amigo Smokeless Coal Co., with headquarters at Lillybrook, W. Va. A veteran of 27 yr in coal mining, Mr. Barnard attended West Virginia University. His first supervisory position was with the Bethlehem Mines Corp., where he remained from 1924 to 1939 as mine foreman and superintendent. He joined the Koppers Coal Div., EG&FA, as mine foreman at Koppers-town in 1939 and in 1941 was transferred to Carswell as superintendent. He became associated with Lillybrook in 1946 as general superintendent and was promoted to general manager in 1948.

Carl Mercer, superintendent of the Closplint mine of the Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., has been transferred as superintendent of Consol's No. 214 mine, McRoberts, Ky., succeeding **Carl Dann. Kenneth Hughes,** formerly superintendent of the company's Hendrix mine, has joined the Eddie Greer Coal Co., Grundy, Va., as general foreman.

Kenneth Johnson, formerly general foreman, Page mine, Coal Div., Eastern Gas & Fuel Associates, has been transferred to the Beards Fork mine in a similar capacity. **Walter Wolford,** previously at Wharton No. 2 mine, is now tipple foreman at Beards Fork.

Harold V. Richmond, Belleville, Ill., has been appointed Illinois state mine inspector for the Pana district. Mr. Richmond has been a face-boss at the St. Ellen mine of the Perry Coal Co. for the past 2 yr and previously held a similar position with the Valier Coal Co.

Several changes in operating personnel of the Philadelphia & Reading Coal & Iron Co. have been announced by George A. Roos, vice president in charge of operations, effective Nov. 1. **Clem J. Decker** has been named superintendent of the company's Ashland Div., replacing **Francis W. Chesney. W. S. Zartman,** superintendent at Hunter Tunnel, has been appointed superintendent at Potts colliery, to succeed Mr. Decker. **Clarence Whaite,** superintendent at Buck Run colliery, has been made superintendent at Hunter Tunnel, succeeding Mr. Zartman. **Frank J. Meyer,** division engineer, Mahanoy Div., has been appointed assistant division superintendent, under Thomas V. Monahan, superintendent of the Mahanoy-Shenandoah Div. Several changes in officers were announced by Edward G. Fox, president of P.&R. **Howard Price,** secretary of the company, has in addition been elected a vice president, succeeding **Martin P. McDermott,** who is retiring after 46 yr of service with the company. **Halifax C. Clark,** controller, has been elected vice president and controller, and **William G. Fitzpatrick,** secretary to the president, has been elected assistant secretary of the company. He will serve jointly in this capacity with **Robert M. Lloyd,** assistant secretary since 1929. **Fred C. Hatter,** property engineer, has been appointed real estate engineer, in charge of all P.&R. real estate.

Dr. Bernard Lewis, chief of the Explosives and Physical Sciences Div. of the USBM Northeastern Region, Pittsburgh, has been granted a year's leave of absence from the USBM to become director of powder and explosives research and development, Ordnance Corps, Department of the Army, Washington, D. C. In Dr. Lewis' absence, Dr. Glenn H. Damon will serve as acting chief of the Explosives and Physical Sciences Div. in Pittsburgh.

Synthetic Fuels Future Breeds Arguments

Top oil-industry representatives are strongly debating as "uneconomic" the soundness of immediate construction of plants for the conversion of coal or oil shale to gasoline as currently being pushed by Secretary of the Interior Oscar L. Chapman.

Construction of such commercial plants would be an "unwarranted use of capital, labor and materials at the present time," said Frank M. Porter, president of the American Petroleum Institute, at the institute's 31st annual meeting in Chicago Nov. 7. "With the great amount of unexplored future petroleum prospects which we have for the production of natural crude oil and gas, building of commercial synthetic plants is unwarranted," he said.

Later in the meeting, in a paper read in his absence, Mr. Chapman said that on "the basis of present day economies it appears that a large-scale operation for extraction of oil from shale may be feasible. I feel that the time has come to give this development a serious try." Pointing out that there may be disagreement on the timing and financing details, Mr. Chapman emphasized that "it is perfectly evident that the time will come when this nation must rely in part on liquid fuels produced from coal or shale." Mr. Chapman is already on record as favoring the immediate construction of a coal-conversion plant.

To check the Bureau of Mines' figures on costs of coal hydrogenation, which are particularly disputed by a report of the National Petroleum Council issued Oct. 31, Mr. Chapman Nov. 15 approved studies by an independent organization to assist in determining acceptable engineering and financial bases for estimating costs of products from commercial-sized plants. Ebasco Services, Inc., New York, is to be engaged to study and evaluate the Bureau's operating costs for two hypothetical plants with a capacity of 30,000 bbl daily. The decision to obtain an audit of its estimates was made before the NPC's conflicting figures were released, the Bureau said.

The NPC committee said making of gasoline from coal by the hydrogenation process was "uneconomical" and would require excess quantities of steel. Production from oil shale, however, "warrants continued attention," although the cost is "significantly higher" than in production of gasoline from crude petroleum, it reported.

Figuring on the basis of operating plants with a capacity of 216,000 bbl daily, the group said that the cost of producing gasoline from coal hydrogenation would be about 43½¢ per gallon, exclusive of distributing and marketing expenses. From oil shale, a gallon of gasoline would cost 14.7¢ delivered to a major marketing area.

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"First tire we ever had with a carcass strong enough to master the toughest combination on-and-off-the-road work." The new U. S. Royal Fleetmaster is *job-fitted* to your exact requirements—*gripping penetration* and *traction off the road* when you need it; *smooth-rolling, non-skid mileage on the highway* when you want it!

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- ★ *70% deeper traction tread!*
- ★ *Tougher, stronger carcass! (More Recaps)*
- ★ *Job-Fitted tread compounds!*
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You can get all the facts about the new Fleetmaster from your nearest U. S. Royal Dealer. **A phone call does it!** He's listed in the Classified Telephone Book.

UNITED STATES RUBBER COMPANY

***INDUSTRY MEETING*—A Special Coal Age Staff-Written Report**

STEEL-CABLE BELTS, GOVERNMENT RELATIONS, ENGINEERING EDUCATION AND DUST CONTROL—G. S. Jenkins (left), Bell & Zoller Coal & Mining Co., retiring institute president; Fred A. Miller, Chicago, Wilmington & Franklin Coal Co., session chairman; J. L. Thornton, Goodyear Tire & Rubber Co.; C. W. Connor, DSFA; B. E. Schonthal, Institute secretary-treasurer; R. D. Caudle, University of Illinois; and W. H. Tomlinson, USBM.

Illinois Group Scans Methods, Outlook

Fifty-ninth annual meeting throws spotlight on . . .

Steel-Cable Conveyor Belts
Heavy-Media Preparation
Commercial Salvage of Sulphur
Defense Spurs for Coal Markets

DUST CONTROL in roof drilling, steel-cable conveyor belting, growing needs of the defense program for coal, design of heavy-media coal preparation plants, fine-coal recovery, control of stream and air pollution and salvage of sulphur from coal and coal wastes were top subjects at the 59th annual meeting of the Illinois Mining Institute, Springfield, Ill., Nov. 2. Close to 800 coal men and representatives of manufacturers and allied interests registered for the one-day session.

Members elected Clayton G. Ball, Paul Weir Co., Chicago, president for the coming year. William Bolt, Freeman Coal Mining Corp., Farmersville, Ill., was named vice president, and B. E. Schonthal, Chicago, was re-elected secretary-treasurer. The following directors were elected: 3-yr terms—J. S. Forman, Mt. Olive & Staunton Coal Co., St. Louis, Mo.; E. E. Green, Old Ben Coal Corp., West Frankfort, Ill.; Lawrence Kiss, Superior Coal Co., Gillespie, Ill.; and Moss Patterson, West Kentucky Coal Co., Madisonville, Ky.; 2-yr term—Rice W. Miller, Nokomis Coal Co., Nokomis, Ill.

G. S. Jenkins, institute president and vice president, Bell & Zoller Coal & Mining Co., opened the morning, afternoon and evening sessions. Fred A. Miller, Chicago, Wilmington & Franklin Coal Co., Waltonville, Ill., presided at the morning session; Robert N. Morris, Sahara Coal Co., Harrisburg, Ill., at the afternoon session.

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More Scrap—More Steel

Engineers Becoming Scarce

Only 25,000 engineering graduates are in prospect in the Nation in 1952 against job opportunities for some 96,000, said Professor Harold Walker, Department of Mining & Metallurgical Engineering, University of Illinois, who reported for the institute's scholarship committee. In fact, he stated, out of some 180,000 students enrolled in engineering, only 1,607 are studying mining engineering. This situation points to a critical shortage of engineering skills in the years ahead, created by the low birth rate during the depression of the '30s, misleading statements as to the need for engineers following World War II, and the draft. At the University of Illinois, out of a total of 22,044 students enrolled in 1951-52, 2,736 are studying engineering and 60 are studying mining engineering, against 1949 figures of 28,592 total students, 4,144 in engineering and 96 in mining engineering. Of the 17 students now holding mining engineering scholarships at the University of Illinois, eight will be graduated in 1952.

Although the recent Illinois legislature changed mine-examiner requirements to allow credit for time spent in college-level mining-engineering courses, the law was so worded that its intent cannot be fulfilled, Professor Walker explained. He reported also that mining extension courses now are being operated successfully by state vocational services.

The educational situation is not as good as it should be nor as bad as it might be, said M. D. Cooper, manager, vocational training and education, National Coal Association, who added his comments to those of Professor Walker. Mr. Cooper urged coal operators to make summer employment available to mining-engineering students lest other industries skim off the cream of engineering talent.

Dust Control in Mines

Free-silica content of dust samples from 51 mines in Region VIII averaged 31% and ranged from 7 to 88%, said James Westfield, chief, Accident Prevention & Health Section, District VIII, USBM. In Mr. Westfield's absence, his paper was presented by W. H. Tomlinson, USBM, Vincennes, Ind. In spite of high silica content, however, dust control is not practiced at 71% of the mines that use roof bolts, Mr. Westfield reported. His paper was summarized at length in the July, 1951, issue of *Coal Age* p 182.

In reply to a question by Robert Fletcher, J. H. Fletcher Co., Mr. Tomlinson explained that the dust under discussion is 10 microns or less in size and is what is commonly known as "injurious dust."

Steel-Cable Belts

Steel-cable belting has many advantages over conventional conveyor belting, said J. L. Thornton, manager, Coal Div.—Belting Sales, Mechanical

HEAVY-MEDIA PLANTS AND METHODS, AIR AND STREAM PURIFICATION, AND SULPHUR RECOVERY AND MARKETS—R. N. Morris (left), Sahara Coal Co. and president, Illinois Society of Coal Preparation Engineers and Chemists, session chairman; R. C. Woodhead, McNally Pittsburg Mfg. Corp.; L. C. McCabe, USBM; Raymond Kloepper, United Electric Coal Cos.; Elmer Citron, Pittsburg & Midway Coal Mining Co.; and W. H. Voskuil, Illinois State Geological Survey.

Goods Div., The Goodyear Tire & Rubber Co., Inc. These advantages include the following:

1. **Strength**—Lifts up to 400 ft vertically on inclined conveyors handling fairly light materials are about the limit for untreated cotton construction. Steel-cable belts have doubled this lift and are handling still more difficult slopes.

2. **Length stability**—Stretch and shrink are negligible in steel-cable belts, whereas conventional belts change up to 2% or more as moisture and temperature change.

3. **Tension induced by bending**—The steel-cable belt, built with a single layer of cables, extends tension capacity far beyond that of the strongest cotton belts.

4. **Inspection**—There's no guesswork in inspecting steel-cable belts. A fluoroscope provides quick and accurate examination. Splicing is easy.

5. **Design features**—It is clear that cables running over pulleys 500 to 1,000 times the cable diameter at intervals of more than 5 min does not present a serious bending problem. Likewise, if properly bonded, the cables will not cut down through the rubber while bending, unless radial pressure is too great.

The outstanding steel-cable slope-conveyor belt installation in the United States is the 42-in belt at Orient No. 3 mine, C. W. & F. Coal Co., Waltonville, Ill., Mr. Thornton said. This belt carries 1,200 tph of coal up a vertical lift of over 868 ft at 625 fpm. Travel distance is 3,290 ft along the slope. Design load is approximately 90,000 lb of tension. Take-up allowance is only 25 ft of counterweight travel, only a small part of which ever will be used.

To provide transverse stiffness, since the side-by-side pattern of the steel cables does not provide transverse rigidity, 1,510 sq yd of fabric is included in the belt. Rubber covers of the belt weigh 75,292 lb. There are 240 cables of 5/32-in diameter in the cross-section. Total belt weight is 89 tons. Belt and load are moved by a 1,500-hp synchronous motor driving through an eddy-current clutch. The head pulley is only 72 in. in diameter. Total time required for installing the

(*Continued on page 170*)

COAL MEN ON THE JOB

IN WEST VIRGINIA, on the annual inspection tour made by directors and top officials of the Baltimore & Ohio R. R.: Col. R. B. White (left), B.&O. president; J. R. Maust, president, Maust Coal & Coke Corp.; and M. L. Alley, general manager, Gauley Mountain Coal Co.

IN ILLINOIS, at Mine No. 3 of the Superior Coal Co., Gillespie: John Herman (left), electrical engineer, and Stewart Pratt, assistant superintendent of mines, are hosts to Mrs. Mary Stinson, of the locomotive design group of the Goodman Mfg. Co., Chicago, in a tour of the property.

News Briefs and Trends

Bituminous Output Holds Up

1951 production of bituminous coal totaled 456,759,000 tons through the week ending Nov. 10, a gain of 4.5% over the 436,906,000 tons produced in the same period of 1950. Up to Nov. 10, 1951, anthracite was down 9.1%, with a tonnage of 35,057,000, as compared with 38,562,000 tons last year. Meanwhile, coal dumpings at Hampton Roads again set a new record in the month of October, with a total of 3,794,843 gross tons that topped the previous all-time high set in September. For the first 10 mo of 1951, the port had handled 29,717,096 tons, compared with 9,435,822 tons in the same period of 1950.

Pa. Strip Rule Unenforceable

Open-pit operators in Pennsylvania need not register in each county in which they conduct operations, including the filing of a separate bond and paying a $100 filing fee for each county, as ordered by Richard Maize, Secretary of Mines, Judge George H. Rowley, of the Mercer County Court, held in an opinion issued Nov. 9. He also ruled that Mr. Maize had no authority for requiring open-pit operators to register, pay a separate filing fee of $100 and post a separate bond for each individual operation. The decision, made on a petition of the Bowie Coal Co., Grove City, Pa., concluded "that it was not the intention of the legislature to require" such actions and that "consequently, the Secretary of Mines was without authority to so require."

UMWA Hits Wildcat Strikes

In a letter addressed to all members and officials of local unions, the three top UMWA officials urged all local and district officials and members not only to refrain from participating in unauthorized strikes but to also use their efforts and influence to prevent their occurrence. The letter, dated Oct. 24 and signed by John L. Lewis, Thomas Kennedy and John Owens, made the request on the behalf of the International Executive Board after an unanimous vote. The letter pointed out that during the past year a wave of unauthorized local strikes or work stoppages had occurred in various districts and that in nearly all of them the machinery provided for consideration and disposition of grievances was not invoked. It emphasized that the strikes adversely affect the contracts with operators; cause unnecessary loss of earnings and hardship to members; discredit the union's record of honoring its contracts; have resulted in union operations losing business to competitors; and not only endanger the stability of the coal industry but encourage operators to demand punitive clauses in wage agreements.

Island Creek Sets Safety Mark

The Island Creek Coal Co. Nov. 15 announced a new mark in safe coal production. From July, 1950, to Nov. 13, 1951, the firm produced 10,000,000 tons of coal without a single fatality, H. H. Barber, general manager, and C. E. Linkous, director of safety, reported. The output came from 10 mines, several of which have unusually impressive records. Mine No. 7, for example, has produced 5,724,000 tons without a fatality since June, 1946. Mine No. 1 has mined some 4,500,000 tons since Jan. 1, 1947, without a death.

Commercial Pilot Plant To Make Chemicals From Coal

Important progress toward the commercial production of critical chemicals and synthetic petroleum by the hydrogenation of coal may result from the commercial pilot plant being constructed by the Union Carbide & Carbon Corp. at Institute, W. Va., Secretary of the Interior Oscar L. Chapman recently reported. The plant, which will process about 300 tons of coal daily, will cost some $11 million and will be the only one of its kind in the U. S. It will make a number of vital chemicals which are currently in short supply. Various types of coals will be used in research and development, with a consequent broadening of technical knowledge of the coal-hydrogenation process, Mr. Chapman pointed out.

New Freight Rise Protested

Four federal agencies Nov. 13 joined the fight against efforts of the nation's railroads to get another increase in freight rates. Although the railroads were granted new increases Aug. 2, which for coal amounted to 6%, they are continuing the fight and asked the ICC for re-opening of hearings. The federal agencies filing protests with the ICC included the OPS, Department of Commerce, General Services Administration and the TVA. The railroads' latest move had been protested earlier by the National Coal Association and a number of other state and region coal groups.

Miners' Wives Close Mines, Protesting Sale of Homes

Miners' wives picketing in protest of the sale of company-owned homes closed down three mines of the Consumers Mining Co. Nov. 10 as miners refused to pass the picket line. Sale of the 145 dwellings in Harmarville,

(*Continued on p 166*)

★ ★ ★

Need Steel? Scrap's the Answer

★ ★ ★

COAL MEN ON THE JOB

BLUE DIAMOND COAL CO.: Supervisors of the new Leatherwood (Ky.) mine described on pp 74-87 of this issue include the following (section foremen unless otherwise noted): DAY CREW (top photo)—Jack Hollan (standing, left), Ira Duff, William B. Wright, dispatcher; Clay Sampsell, J. H. Combs, J. D. Boyd, Stanley C. Goodwin, general mine foreman; Ben Spurlock and L. O. Slagle, assistant mine foremen; S. C. Maggard, Charles Hensley (seated, left), Whitt Cinnamon, John Asher, track foreman; N. N. Sturgill, Earl Alley, Clayton Vanover and Brack Colwell.

NIGHT CREW (lower photo)—Roy E. Barnes (standing, left), Frank Bird, B. A. Barton, Clyde Reynolds, Felix Napier, dispatcher; Herman Colwell, safety foreman; Shelby Bird, Elmer Helton, E. V. Tester, Shelby Perry (seated, left), Harlie Mullins, general night foreman; E. D. Hinkle, O. V. Duncan, Jesse Eversole, haulage foreman; and M. T. Deaton, assistant foreman.

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CONTINUOUS MINING—F. R. Zacher (standing, left) and H. A. Quenon; seated, Max H. Forester (left) and C. R. Bourland.

EUROPEAN PREPARATION AND DUST CONTROL—R. E. Zimmerman (left), H. E. Mauck and Leslie C. Gates.

Mining, Preparation and Utilization Major Topics at . . .

West Virginia Institute Meeting

Results with continuous mining, coal preparation in Europe, dust control in coal mining, and the possibilities for economical conversion of coal to gasoline feature West Virginia Institute sessions

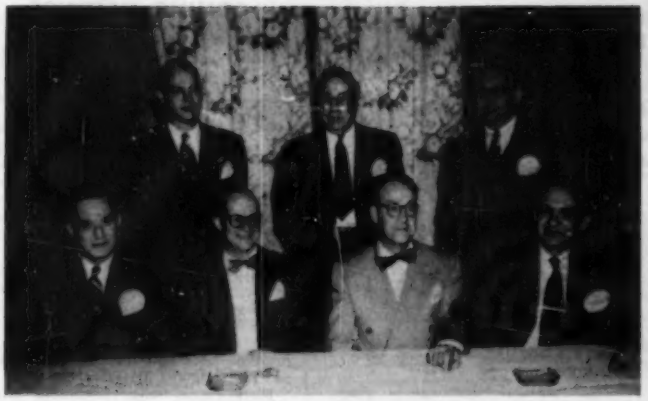
CONTINUOUS MINING, European coal preparation, dust control and gasoline from coal were the themes of the fall meeting of the West Virginia Coal Mining Institute, held at the Summit Hotel, Uniontown, Pa., Nov. 9-10.

C. R. Bourland, vice president in charge of operations, The New River Co., and institute president, presided over the technical sessions and served as toastmaster at the dinner, at which Ralph C. Mulligan, director of public relations, Bituminous Coal Institute, Inc., spoke briefly and presented a preview of a new coal film about to be released. A. J. Alexander, chief, West Virginia Department of Mines, presided at a luncheon at which James Hyslop, president, Hanna Coal Co., addressed those in attendance on "The Crisis in Morals."

Max H. Forester, vice president, Pittsburgh Consolidation Coal Co., served as chairman of the continuous-mining symposium. H. E. Mauck, general manager, Olga Coal Corp., presided at the session on preparation and dust control, and C. J. Flippen, labor commissioner, Kanawha Coal Operators' Association, was chairman of the last session, at which Joseph Purnglove Jr., vice president—re-

COAL INTO GASOLINE—C. J. Flippen (left), session chairman, and Joseph Purnglove Jr., speaker.

MORAL CRISIS—James Hyslop, speaking at the institute luncheon, with A. J. Alexander serving as the presiding officer.



NEW OFFICERS—Charles R. Nailler (left), Jesse Redyard and G. R. Higinbotham; seated, A. J. Alexander (left), C. R. Bourland, James F. Trotter and G. R. Spindler.

search, Pittsburgh Consolidation Coal Co., spoke on the practical aspects and economics of coal conversion to gasoline.

Continuous Mining

In opening the continuous-mining symposium, Mr. Forester said that 160 to 170 continuous miners are now in the mines but that only about 50 are in regular commercial production, the remainder being on an experimental basis. Less than five mines are getting all their output from continuous miners. In addition to the three distinct types of machines now available, three other types are in development.

Over 60 tons per man-shift, an average of 440 tons per machine-shift, and peaks of over 700 tons for 147 shifts of experience with a Jeffrey 76B Colmol were reported by F. R. Zachar, general superintendent, Christopher Coal Co. The machine is in the 3,500-ton Brock mine in the 72-in Sewickley seam, where 6 in of high-ash bottom coal is left. The roof is excellent over most of the mine. The Colmol is working in a section with favorable conditions, driving a main entry consisting of five 16-ft headings.

The original plan of driving the crosscuts only 9½ ft—the cutting width of the machine with 18-in arms, was abandoned after a few hours' trial and the width was increased to 16 ft. This permits turning crosscuts at 90 deg and provides room for proper timbering. The original plan did not provide safe clearance for the operator. Now, the machine sumps in for 25 ft and then backs up to take the remaining 6½ ft of width. The speed of forward advance is 18 in per minute.

The coal is discharged onto the mine floor and then loaded into shuttle cars by a 7-BU machine with paddles 12 to 14 in high added to the digging arms to provide higher capacity. Without the loading machine, the Colmol lost too much time cleaning up spillage when taking the 6½-ft open cut.

Timbermen using a hand-held drill plugged into the loader install pegs in the rib every 10 ft for hanging the continuous-miner cables. These consist of two 250,000-cir mil power conductors and a No. 2 motor cable as a ground. The water hose from an auxiliary pump providing spray water at 100 psi also is hung on the pegs. One 200-kw m-g set, not connected into the trolley system, operates the Colmol section.

★ ★ ★

Cash In Your Scrap for Steel

West Virginia Officers

President—James F. Trotter, president, Trotter Coal Co.

Vice Presidents—A. J. Alexander, chief, West Virginia Department of Mines; H. A. Quenon, division manager, Eastern Gas & Fuel Associates; R. C. Luther, vice president, Pearless Coal & Coke Co.; C. E. Hough, vice president and general manager, Imperial Smokeless Coal Co.; and Charles R. Nailler, president, Christopher Coal Co.

Executive Board—L. E. Tierney, president, Eastern Coal Corp.; J. J. Foster, assistant to the president, Island Creek Coal Co.; Jesse Redyard, president, Redyard Coal Co.; G. R. Higinbotham, president, Consolidation Coal Co. (W. Va.); and C. R. Bourland, vice president in charge of operations, The New River Co.

Secretary-Treasurer—G. R. Spindler, director, School of Mines, West Virginia University, Morgantown, W. Va.

A crew consists of one Colmol operator, one 7-BU operator, three shuttle-car operators and two timbermen. Neither the foreman nor a part-time mechanic was included in computing the productivity figure of over 60 tons per man-shift.

More than 17,000 ft of headings and crosscuts have been driven by the Colmol and no roof cutters have been encountered. It is thought that this freedom from cutters is a result of elimination of shooting. The cutters are roof cracks that develop and progress rapidly along the rib. In conventional mining they have to be stopped by cutting a notch in the rib ahead. Normal timbering in Colmol development consists of roof jacks and cap boards.

Carbide bits are used on the Colmol and, although the coal is soft and contains no sulphur balls, the bit cost is high—perhaps 6 to 7c per ton—in large measure a result of frequent cutting into the roof.

A 35BB shortwall is kept in the section so that if the miner breaks down the section can continue to produce with the crawler loader. This is another advantage of using the loader between the Colmol and the shuttle cars. Use of the 7-BU does not add to the crew. If it were not employed, there would be a helper with the Colmol and he would not be kept busy. Within the next 3 or 4 mo it is hoped to have enough development so that the Colmol can be put to full-retreat pillar-mining.

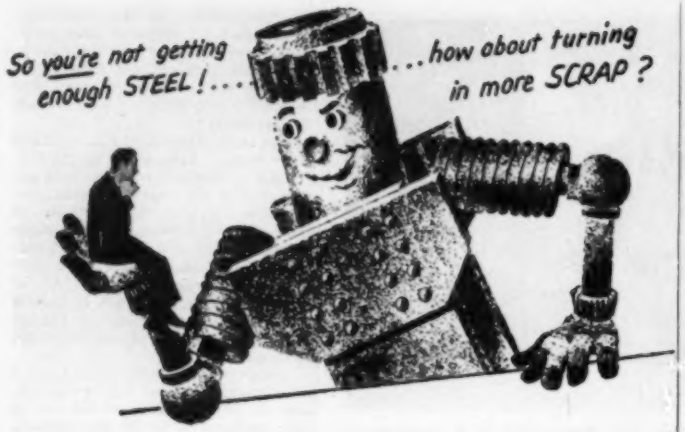
Commenting on the present status of continuous miners in pillar-mining, Chairman Forester said that each of the three current types of machines is now regularly mining pillars.

Use of a Joy continuous miner in Pittsburgh-seam development and pillar-extraction in Federal mine, Grant Town, W. Va., was described by H. A. Quenon, division manager, Eastern Gas & Fuel Associates. Pillaring might be classed as modified longwall, since mining is open-ended and face length is approximately 100 ft.

Over a 5-mo period of developing and pillaring, the machine averaged over 360 tons per shift. In computing tonnages per man-shift, all men in the section are included: foremen, track crew, and men engaged in rock dusting and advancing wire, etc., in all totaling 5 men over the 5-man crew. On this basis, the average over several months is 36.1 tons per man-shift.

Room centers were fixed at 113 ft so that one lift along the face of a room pillar or block would keep the machine busy one shift. Width of the open cut is 14 to 22 ft, and sometimes is varied during the shift to permit the machine to finish a cut. For the next shift, it moves to an adjoining pillar. A fall then is induced in the first block, and so on, the machine alternating between the two pillars. A favorable condition is an adjoining pillared area in which the 370-ft rooms are terminated. This makes it easier to get the first break.

Haulage is by shuttle car and the



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• • •

Remember—the Nation's productive effort depends primarily on steel—and steel depends on SCRAP . . . *your* scrap. Turn it in—NOW.

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UNITED STATES STEEL

COMING MEETINGS

Coal Mining Institute of America: 65th annual meeting, Dec. 13-14, William Penn Hotel, Pittsburgh, Pa.

use of one car as a surge bin was tried with practically no gain. Dropping the coal on the floor and adding an 11-BU to load it increased production 30%. Two man-shifts of cleanup labor were eliminated and the extra shuttle car was placed in a crosscut to serve as a spare.

With each advance of 18 in by the miner, the inby crossbar held up by the hydraulic jacks on the miner is given new roof-jack support, and another crossbar is placed on the hydraulic jacks and forced against the roof. Places are driven 11 ft wide.

Maintenance with continuous mining is estimated to be about 50% higher than with conventional mining. The principal difficulty is sulphur balls, which make it necessary to use carbide bits. Cost of bits has been as high as 26c per ton, but has dropped considerably in pillar work.

A late-type Joy head is on order to replace the original chain-type head that has been on the machine since it was placed in the mine in February, 1949. Spray water containing Compound M1 is brought to the continuous miner at 125 psi by hose from the main pipe line. One 300-kw substation is required for power for the section.

Closing the symposium, Mr. Forester, commenting on the transportation problem and the practice of using a loading machine behind the miner, said that when a new mine is outfitted for continuous operation, loading machines are not going to be added. Regardless, however, he predicted as a certainty that the low-cost mine of the future will use continuous equipment.

"Some European Coal Practices" was the subject of a paper on preparation presented by R. E. Zimmerman, chief coal-preparation engineer United States Steel Co.

Dust Control in Mining

The importance of the dust problem, definition of terms, conditions resulting in high dust conditions, and methods of control were discussed by Leslie C. Gates, associate, Ferguson-Gates Engineering Co., Beckley, W. Va. In the course of his study of the problem over several years, Mr. Gates pointed out, it was necessary to acquire portable instruments and laboratory equipment to make dust counts and analyses.

To show the importance of the problem in West Virginia, Mr. Gates summarized Workmen's Compensation Fund silicosis claims, as follows:

Fiscal year 1948-49: 279 claims filed, 235 declared compensable.

Fiscal year 1949-50: 629 claims filed, 555 compensable.

Fiscal year 1950-51: 451 claims filed, 317 compensable.

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With Victaulic Couplings that made 'em just right.

All Elbows and Tees stayed right in their groove
For the Victaulic Method each fitting did prove.
With the world's best system for making ends meet
Each pipe and each fitting was tight in its seat.

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Was the work of none other than jolly Saint "Vic"
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Gasoline From Coal

Gasoline will not be made from coal, declared Mr. Pursglove, until all the residual oil now burned in power plants is upgraded into gasoline and coal has replaced it. In his opinion, he stated, as much coal will be used in 20 to 25 yr to manufacture gas to supplement natural gas as will be used to make gasoline.

In the Pittsburgh area, gasoline made from coal would now cost at least 35c per gallon, compared to the present wholesale price of 13 to 14c. While this country has done a lot to cheapen the production of gasoline from coal, compared to the status of European developments at the end of the war, the hydrogenation process can now be considered 85% developed and the synthesis-gas process 70 to 75%.

Instead of waiting 20 to 25 yr for cessation in the production of residual fuel oils that can be upgraded into gasoline, Mr. Pursglove foresaw the possibility of partial conversion plants in which coal would be carbonized at low temperature, the char burned in power plants, and the liquids made into chemicals and ash-free carbons.

This type of plant will fit into long-range planning for the time when it may pay to take some of the char and the gas, and upgrade the liquids into fuels. The partial conversion plant will not be at the mine but instead closer to the markets to which the products are shipped. When the time comes for complete conversion plants, and the finished products can be pumped away, they will be at the mines and probably can get a cheaper coal because cleaning will not be necessary.

The only commercial synthetic fuel plant in the world is now being built in South Africa. The coal, 26% ash, has a Btu value of only 9,000, and will be used without cleaning. Cost will be only 60c per ton, yet the plant will operate under what amounts to a government subsidy. In the United States, since 60% of the costs of making gasoline would be capital costs, an adequate return on the investment could not be secured if the coal could be obtained for nothing.

Mr. Pursglove warned the industry that by lack of research it is letting itself be squeezed into a corner where the only markets that will remain will be large steam plants and carbon for metallurgical, electrode and lampblack uses. That the $400,000 received in a year by BCR for research is ridiculously small is indicated by the fact that one company alone is spending over $600,000 on experiments in pumping coal through pipes.

WHEN YOU'RE WORKING on a problem, make it a point to check the 1951 Index to COAL AGE (pp 191 to 196). Articles are classified by subject, mine and company and by author.

NOW You Can *See* Where You Can't *Look*

Eliminating Hazards and Reducing Costs

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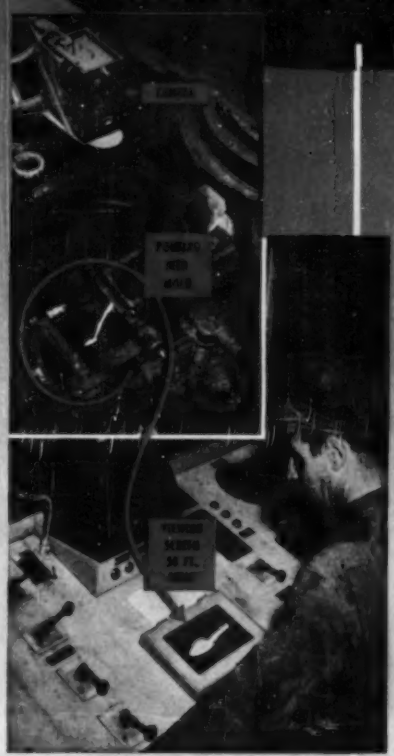

Continuous casting of billets is a process which promises very important reduction of steel making costs. Formerly, a man had to stand close to the stream of molten steel watching the surface of the metal in the mold and always ready to signal the operator 50 feet away. The hazard was great and discomfort from radiant heat quickly became unbearable.

Now, a "Utiliscope" (wired television) camera with a long focal length lens is placed above the metal surface. The viewer is placed at the control panel. The operator can see everything that happens at close range in comfort and safety . . . can watch more effectively than a man close to the molten steel.

This is one of the many applications where the Diamond "Utiliscope" promotes safety . . . improves operation . . . saves labor. The "Utiliscope" extends the power of the eye so you can see around corners, through walls, into fire and through water. It is simple and easy to use. Installation requires no special skill. Adjustment of focus, brilliance and contrast is quickly and easily made.

You may have a place where the "Utiliscope" will save you money, or solve a difficult problem. Write for Bulletin 1025 with complete description; it suggests many possible uses.

OTHER USES

- Studying destructive tests of engines
- Checking remote gage readings
- Observing conditions inside furnaces
- Viewing nuclear research
- Coordinating material flow on conveyors

The "Utiliscope" (Reg. U. S. Patent Office)

WRITE FOR BULLETIN 1025 I

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If you want to look into the possibilities of the "Utiliscope", simply write us for a copy of Bulletin 1025-I which explains the equipment and shows various applications. Please address your request to Department "I".

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by using

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instead of scarce, costly tin base babbitt.

This fine, velvety grain babbitt metal is made entirely from pure virgin metals, perfectly alloyed and heat treated to withstand tremendous loads at high speeds and elevated temperatures that would be dangerous with other babbitts.

Tensile 10,000
Elong 5.5%
Compress. Strength 10,000

Promet XXX will not score, cut or powder even in lubrication failures. The coefficient of friction is considerably less than that of tin babbitts, thus reducing power loss and wear. The entire bearing surface wears uniformly, without pitting.

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Promet XXX has been proven ideal for use in blowers, cement mills, clay working machines, compressors, conveyors, crushing machinery, diesel engines, dredges, fans, machine tools, mining machinery, motors and generators, paper mills, pumps, rock and gravel plants, saws, steel mill bearings and sugar mills.

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COAL MEN ON THE JOB

NEW RIVER CO., MT. HOPE, W. VA.: J. E. Howard (left), chief engineer; C. F. Block, assistant engineer, ventilation and drainage; W. B. Weymouth, assistant engineer, Raleigh mines; Carl H. Samples, assistant engineer, Fayette mines; Vern D. Holman, assistant engineer, stripping; James Thompson, blueprints-files; H. D. Norton, office engineer.

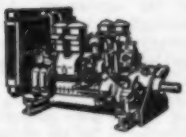
NEW RIVER CO., Stanaford No. 2 mine, night shift: Billy Richmond (standing, left), grade foreman; C. G. Fugate, slate foreman; Tom Cheney, night foreman; R. M. Adkins, J. L. Orren and Marvin Johnson, section foremen; G. T. Browning (seated, left), Frank Hancock, Creed Cook, Robert Vandall, Jr. and D. F. Young, section foremen.

NEW RIVER CO., day crew, Summerlee (W. Va.), mine: G. W. Coffey (standing, left), superintendent; Vernon Cox, mine foreman; J. D. Hodson and Charles Massey, conveyor foremen; Charles Harris, grade foreman; C. E. Walker, Walter Kanla and William Hinte, conveyor foremen; Raymond Fakus (seated, left), safety inspector; John Lagos, assistant mine foreman; C. R. Bowden, section foreman; Paul Boland, preparation engineer; George Scott, Theodore Sabloski and James Tyree, section foremen.

NEW RIVER CO., night crew, Summerlee (W. Va.), mine: John Smith (standing, left), Carl Short and Bedford Franklin, conveyor foremen; Walter Hess, assistant night foreman; Harry Jones, conveyor foreman; W. C. O'Hava, night foreman; Elmer Highter (seated, left), Albert Tilley, Paul Bennett, Cyphus Haney and Davis Sexton, conveyor foremen.

TAKES TOUGHEST JOBS IN STRIDE

Repowered with a GM Diesel Twin Six, this shovel keeps trucks hustling as it removes heavy overburden on a strip mining operation.



"The Twin 6 General Motors Diesel in our Marion Shovel has given her the drive she needed to keep her on some of our toughest jobs," says Mr. Charles Dewees, Manager of Dewees Bros., Kingston, Pa.

Mr. Dewees reports the shovel strips 250 yards of heavy overburden per hour and has been operating 10 hours a day for more than two years. "For us it has been a good, trouble-free combination."

Reasons for such performance are clear. GM Diesel's 2-cycle operation sends high-compression power to the shaft twice as often as 4-cycle engines. When you hit a load, those quick-following power strokes give unmatched recovery.

Then, too, GM Diesels start at the push of a button, require little attention and, with standardized interchangeable parts, they're easier to maintain. Ask your nearest distributor to show you how GM Diesels can cut your costs.

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Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

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New Mine Developments

Acquisition by the Sheridan-Wyoming Coal Co., Monarch, Wyo., of the Arrowhead Coal Co., Denver, Colo., recently was announced by Walter J. Johnson, president of Sheridan-Wyoming. The new owners of the Arrowhead Coal Co. will continue to mine Pinnacle seam Moffat coal from the Arrowhead mine, located in the Oak Hill district of Routt Country, Colo., and are planning an expansion program to increase output to the full extent of market requirements and availability of manpower and railroad cars. Mr. Johnson also announced the acquisition by Arrowhead Coal of the Keystone mine of the Keystone Coal Co. Efforts will be made to increase production of Keystone coal but a shortage of manpower and a serious shortage of railroad cars in the field must be overcome, it was said. Work for 20 to 25 experienced coal miners was being immediately offered by the company. New officials of the Arrowhead Coal Co. are: Walter J. Johnson, president; C. M. Shott, vice president in charge of operations; R. M. Medill, manager of mines; Dan Milosevich, superintendent, Arrowhead mine; and Al Husted, superintendent, Keystone mine. The Sheridan-Wyoming Coal Co., Inc., will direct the sales of Moffat and Keystone coals, which also will be sold through the present Denver office of the Arrowhead Coal Co., the Hayden Coal Sales Co. and the Colorado Fuel & Iron Corp.

Plans for opening of a 6,700-tpd operation in Preston County, near Albright, W. Va., recently were announced by the Freeport Coal Co., Morgantown, W. Va. According to reports, ground has been broken for a $4,000,000 tipple and preparation plant and both deep and strip methods will be used to mine the 28,000-acre tract the company has available. Operation of the property is covered in a contract recently signed between the company and the UMWA, and it is expected that the mine will produce about five times as much coal as the largest operation now active in Preston County. Coal seams in the property include the Upper and Lower Freeport, Bakerstown and Mahoney seams. Construction of a belt conveyor from the plant across the Cheat River to a B.&O. siding is under consideration. Freeport Coal Co., which has no other mines in operation and has previously operated as a land holding and development organization, is headed by Hugh Jarvis, president. Donald L. Silbray is general manager and Fred Kapsch is mining engineer.

Re-opening on a trial basis of the former Mine No. 7 of the Bell & Zoller Coal & Mining Co., Staunton, Ill., was reported early last month following a cooperative working arrangement among the mine labor group, new capital interests and owners of the property. Under the agreement, Adolf Lubin, of Springfield, was to supply capital necessary for 90-days' operation and the mine was to be made available by the Zeigler Coal Co. on a royalty basis. Members of the PMWA Local No. 18 were to provide 10 days of free labor for the re-opening, for which they will be reimbursed later if profitable operation is achieved. Former miners and officials had contended that the 60-yr-old mine could be operated profitably with good management and labor relations and a group began studying the possibilities of re-opening soon after its closing last August. Some 100 of the 250 former miners were expected to be employed. John Hittmeier is to be general manager of the mine; Mike Thomso, mine manager; and S. F. Grone, top foreman.

Morgan Mines, Inc., Indianapolis, Ind., reportedly opened a new large-scale strip mine last month, at Edwards, near Peoria, Ill. William E. Spears is assistant general manager, in charge of the property.

IF—

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You're Using Gravity or An Antiquated Car Haul at the Dump
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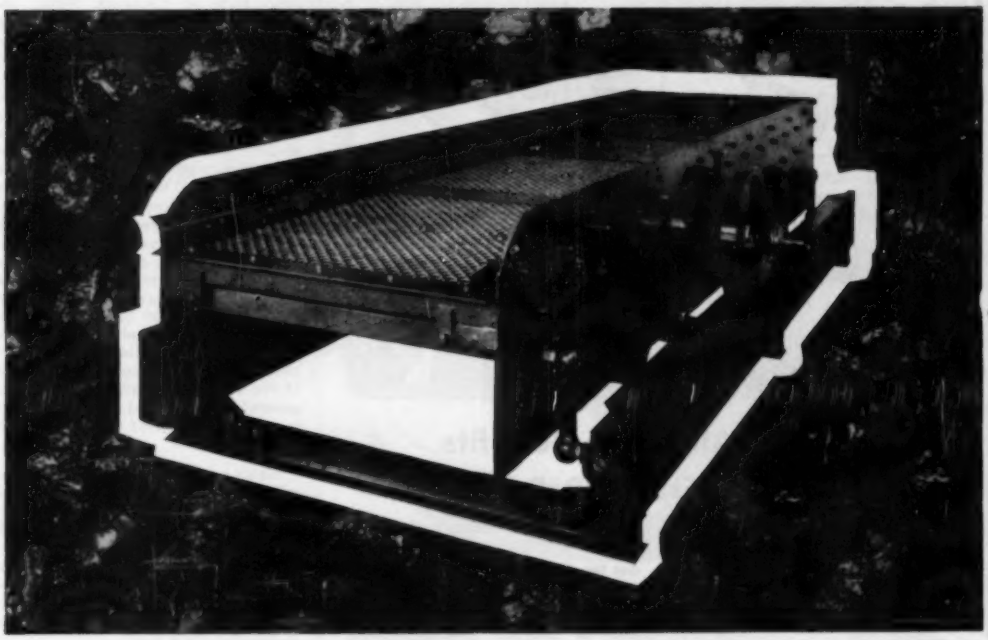

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Simple, easy to put on—saves time, manpower; can be put on with *any* type wrench.

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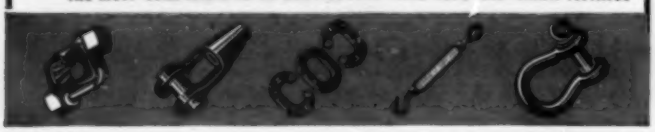

Plans for re-opening the Bellingham (Wash.) coal mines, closed since last July, recently were announced. Officers of the new company, incorporated with a capital of $500,000, include: James H. Tamage and Vernon Pierce, president and vice president, Continental Coal Co., Spokane, Wash.; and Earl McMillan, manager of coal operations, Northwestern Improvement Co., Roslyn, Wash.

The Leavell Coal Co., Tulsa, Okla., recently opened its new Bluebonnet strip mine at Checotah, Okla., reported to be the only coal mine in Oklahoma that supplies all domestic sizes, washed and oil-treated for domestic use. Representing an investment of over $1,000,000, the new mine has a potential production of more than 200,000 tons annually and has a modern preparation plant that provides coal-washing capacity for the entire output. The mine is served by a 6-mi spur connecting to the main line of the Missouri-Kansas-Texas R.R. at Checotah and ships to customers in an 11-state area. At present, a 7-yd dragline is being used to mine the seam which averages 30 in and lies under 35 to 40 ft of overburden. Plans are being completed to increase output by the installation of a 16-yd unit. Col. John H. Leavell is president of the company. Charles R. Towry is general manager and Harrill Burdett is superintendent of the Bluebonnet mine.

Sinking of a new mechanized slope mine near Sparta, Ill., is being planned by the Midwest Utilities Co., it recently was reported. The mine, which will have a capacity of 4,000 tpd and represents an investment of about $1,000,000, will develop property held by H. W. Bradbury, promoter of the project. It will be served by the Missouri-Illinois R.R.

The Hanlin mine property of the Jefferson Coal & Coke Corp., on the Pennsylvania R.R. near Burgettstown, Pa., has been sold to the Mike Starvaggi interests, effective Nov. 1.

An expansion program involving over $1 million was announced last month by the Pennsylvania Coal & Coke Corp. With new machinery and other modernization, the company plans to boost its output from the recent figure of 1,000,000 tons to some 3,000,000 tons annually.

Acquisition by Independent Coal & Coke Co. of two commercial mines from the Utah Fuel Div. of the Kaiser Steel Corp. was formally ratified by stockholders last month. The company is leasing the Castle Gate and Clear Creek properties from James L. White, Salt Lake attorney who previously had obtained options on five Kaiser commercial mines (*Coal Age*, November, p 140). Independent Coal & Coke reportedly has agreed to exercise an option for their purchase before the end of the lease. No immediate

ARE YOU ON A MAINTENANCE MERRY-GO-ROUND?

Every year, the United States spends the fantastic sum of *over eight billion dollars* just on maintenance of its industrial plant—sad proof that too many companies are on a "maintenance merry-go-round"!

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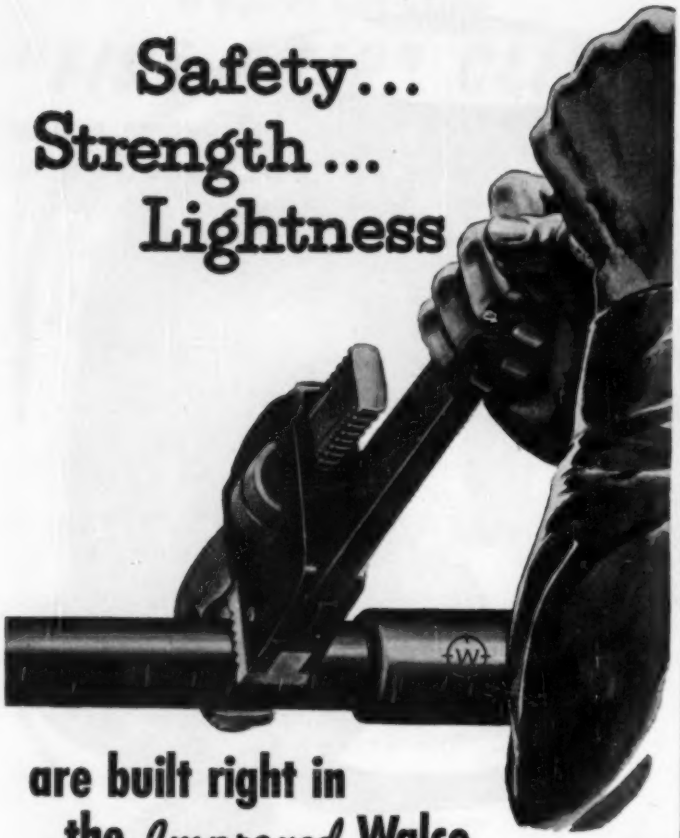

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

change in personnel is expected, the new operators said. Disposition of the three Kaiser mines in Colorado has not been reported.

Johnstown Coal & Coke Co. has taken over the Cortright No. 1 mine of the Beaver Run Coal Co., near Lloydell, Cambria County, Pa., producing from the Lower Freeport seam. Following extensive modernization, current output of 400 tpd is expected to be increased to 1,200 tons.

The Powhatan Mining Co. reportedly is planning to spend $750,000 for improvements at the recently acquired Mine No. 3 of the Rail & River Coal Co., Dilles Bottom, Ohio. The program includes docking facilities for river loading of barges, a 1,700-ft conveyor from the present tipple to the dock and the addition of screening equipment in the tipple.

Development by the Blair-Oldham Coal Co. of two operations with an initial capacity of 2,000 tpd recently was announced by Emmett Blair, Whitesburg, Ky. The mines, a stripping and a truck operation, will develop property leased from the Kentucky River Coal Corp. and will ship via the Rockhouse Branch of the L.&N.

Preparation Facilities

Bethlehem Steel Co., Coke Dept., Johnstown, Pa.—Shipment by Deister Concentrator Co. of 30 Super Duty Diagonal-Deck No. 7 coal-washing tables for cleaning metallurgical coal (in addition to 14 tables previously reported as shipped).

Guyan Eagle Coal Co., Mine No. 5, Blair, W. Va.—Contract closed with McNally Pittsburg Mfg. Corp. for raw-coal dumping, conveying, screening and loading facilities for 500 tph of R-O-M coal, with hand-picking and crushing facilities of plus 8-in coal via a 36x54-in heavy-duty single-roll crusher.

Guyan Eagle Coal Co., Mine No. 5, Blair, W. Va.—Contract closed with McNally Pittsburg Mfg. Corp. for 300-tph washing and screening plant addition comprising: 8x0 raw-coal conveyor to classifying screen to classify to 8x1 and 1x0; the latter classified at ¼ in, with the 1x¼ rejoining the 8x1 to be cleaned in one No. 523 McNally Norton automatic Baum-type washer; raw ¼x0 may be loaded direct or selectively mixed with washed sizes; washed coals classified at 8x5, 5x3, 3x2, 2x⅝ and ⅝x¼; minus ⅝-in coals recovered via special dewatering-type elevator and dewatered via vibrating screens; plant complete with water-handling and clarification system; all washed prepared grades boom-loaded.

Truax-Traer Coal Co., Pyramid mine, Pinckneyville, Ill.—Contract closed with McNally Pittsburg Mfg.

Gets around on any ground

This big 1½ yd. HM PAYLOADER with its combination of large pneumatic tires and 4-wheel drive gives you fast-action traction on all kinds of footing — on sand, stone, snow, clay or mud. It gives you crawler-like traction at far less maintenance expense, PLUS speed when you want it.

This special tractor-shovel also gives you easy operation and maneuvering speed through power-boosted steering and full-reversing transmission. There are four speeds in reverse as well as forward. Double-acting hydraulic rams raise and lower the booms . . . dump and close the bucket . . . exert tons of down-pressure for tough digging conditions.

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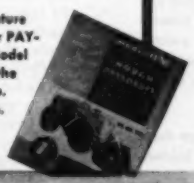
75 H.P. gas or diesel

WRITE for literature on this Model HM or smaller PAY-LOADERS; the 1¼ yd. Model HY; the ¾ yd. Model HF; the ½ yd. Model HE; the 12 cu. ft. Model HA. No obligation.



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Corp. for centrifugal drying addition consisting of vibrating desliming screens to deliver 150 tph of $^{9}/_{16}$-in by ½-mm coal to three McNally Carpenter centrifugal driers, complete with conveying and load-out equipment; also for one No. 2030 McNally Norton rewashing addition to process 100 tph of crushed middlings from present washing facilities, plus portion of raw-coal screenings.

Truax-Traer Coal Co., Ceredo central preparation plant, Ceredo, W. Va.—Contract closed with McNally Pittsburg Mfg. Corp. for thermal-drier addition consisting of four McNally Pulso special fine-coal driers to dry 200 tph of $^{3}/_{16}$x0 centrifuged coal; plant complete with wet- and dried-coal handling facilities.

Alabama Power Co., Gorgas mine, Gorgas, Ala.—Contract closed with McNally Pittsburg Mfg. Corp. for washing equipment to clean 300 tph of 3x0, comprising: one No. 523 McNally Norton automatic Baum-type jig complete with water-circulation equipment, and sludge-recovery system including sludge-recovery conveyor, dewatering elevator and vibrating screens; plant designed by Alabama Power Co.

Northeast Kentucky Coal Co., Wurtland, Ky.—Contract closed with McNally Pittsburg Mfg. Corp. for washing equipment to handle 300 tph of 5x0 comprising one No. 523 McNally Norton automatic washer and complete water-handling and washed-coal crushing facilities; plant constructed by Northeast Kentucky Coal Co.

Midland Electric Coal Corp., Farmington plant, Farmington, Ill.—Contract closed with McNally Pittsburg Mfg. Corp. for coal-cleaning and thermal-drying addition to existing washing and drying facilities consisting of the following new equipment: No. 52H4FL McNally Mogul washer to process 500 tph of 7x0 raw coal, complete with raw- and washed-coal sluices and additional water-handling facilities; ¾x0 washed coal receives further dewatering on vibrating dewaterizer prior to being delivered to the thermal-drying section being augmented by one No. 7525 McNally Vissac Down-Draft thermal drier to dry 75 tph of ¾-in by ½-mm; drier complete with automatic temperature controls; McNally Reintjes drier furnace equipped with McNally Pittsburg spreader-type stoker; drying-plant addition complete with dewatered- and dried-coal handling equipment.

Lone Star Coal Co., Brazil, Ind.—Contract closed with McNally Pittsburg Mfg. Corp. for coal-washing addition to existing raw-coal screening facilities, comprising one No. 2030 McNally Norton unit-type washer, complete with scraper-type sludge tank and water-recirculation facilities; sin-

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We suggest you read the accompanying case histories to see what LEADOLENE KLINGFAST has done for others . . . then describe your toughest lubrication problem and Brooks will prepare a sample designed to give best service on that particular application.

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Case Studies

WIRE ROPE

A certain strip mining shovel, on which a conventional lubricant was used, had a wire rope failure on an average of every 18 days of service. A single application of KLINGFAST extended the service to a record of 31 days.

CORROSION PROTECTION

Due to sulphurous and other extremely corrosive agents used in quenching, the steel work in and around the quencher station of by-products coke plants is subjected to most severe corrosion. In one specific application maintenance costs were particularly high since no paint would protect for as much as a year. A grade of KLINGFAST, which was brushed on as a protector coating, gave in excess of two years of protection.

OPEN GEARS

A motor-operated hoist equipped with double herringbone cut teeth pinions and gears is used to operate 5-ton clam shell buckets at a large coke plant. Although a high grade plastic compound was applied every 24 hours, it failed to prevent wear of the gearing. On this application, which includes intermittent operation, reversing, high speed, severe shock and contamination from coal dust, KLINGFAST is applied only once every 10 days, and costs 25% less per pound than the lubricant it replaced.

DIPPER STICKS

Due to excessive moisture and other conditions, a company had to lubricate their shovel dipper stick once each day. Since KLINGFAST has been adopted as their standard, lubrication application now is necessary only once every three weeks.

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Mining machines are quite a problem in lubrication because of water, dust, shock, vibration, speed and excessive loading. LEADOLENE fluids have proven a great advantage in the gear cases of loaders in one large mine because of repellence of water, adhesiveness to prevent excessive leakage, high film strength to prevent wear of gears and worms and other characteristics for this tough job. Lubricants take a terrific beating and LEADOLENE is one that stands up and takes it.

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gle-roll crushing of selected washed coals.

Sahara Coal Co., Harrisburg, Ill.—Contract closed with McNally Pittsburg Mfg. Corp. for replacement of existing thermal-drying facilities consisting of three No. 7525 McNally Visaac Down-Draft thermal driers to dry 225 tph of ¾-in by ½-mm; new McNally Reintjes drier furnace complete with McNally Pittsburg overfeed stokers.

Obituaries

Edward Griffith, 68, long prominent as a leader in the anthracite industry, died Oct. 24 at his home in Kingston, Pa., following a sudden heart attack. At the time of his death, Mr. Griffith was president of the Glen Alden Coal Co., the Delaware, Lackawanna & Western Coal Co. and the Lehigh & Wilkes-Barre Corp. He was a member of the Anthracite Operators' Negotiating Committee, the Anthracite Board of Conciliation and the Committee of Twelve. He was a director of the Anthracite Institute and was chairman of the board of the First National Bank of Wilkes-Barre, in addition to official posts with various community and educational organizations. Mr. Griffith first entered anthracite mining in 1902, after graduation from the Bloomsburg State Normal School, joining the Lehigh & Wilkes-Barre Coal Co. as a clerk. He held various positions with that company, becoming general manager in 1928. On its merger with Glen Alden, he became general superintendent of the southern district. In 1934 he was made vice president and general manager of Glen Alden, moving up to the presidency in 1946.

Alexander W. Pollock, 83, since 1917 vice president and general manager of the Spruce River Coal Co., Ramage, W. Va., died Nov. 3 at his home of a heart ailment. Long active in the Kanawha Coal Operators' Association, Mr. Pollock had been director emeritus of the organization in recent years. For several years after leaving college, Mr. Pollock assisted his father who was superintendent of the Fall Brook (Pa.) Mining Co. Later on he was general manager of a group of lead mines in Missouri and then became a mining executive in North Dakota and Wyoming.

E. Guthrie, 79, retired coal operator of Harlan, Ky., who with his brother, E. O. Guthrie, of Knoxville, was one of the pioneers of coal mining in Harlan County, died Nov. 15 near St. Petersburg, Fla., following a sudden heart attack while on a hunting trip. Mr. Guthrie was the father of Charles S. Guthrie, president of the Harlan Fuel Co.

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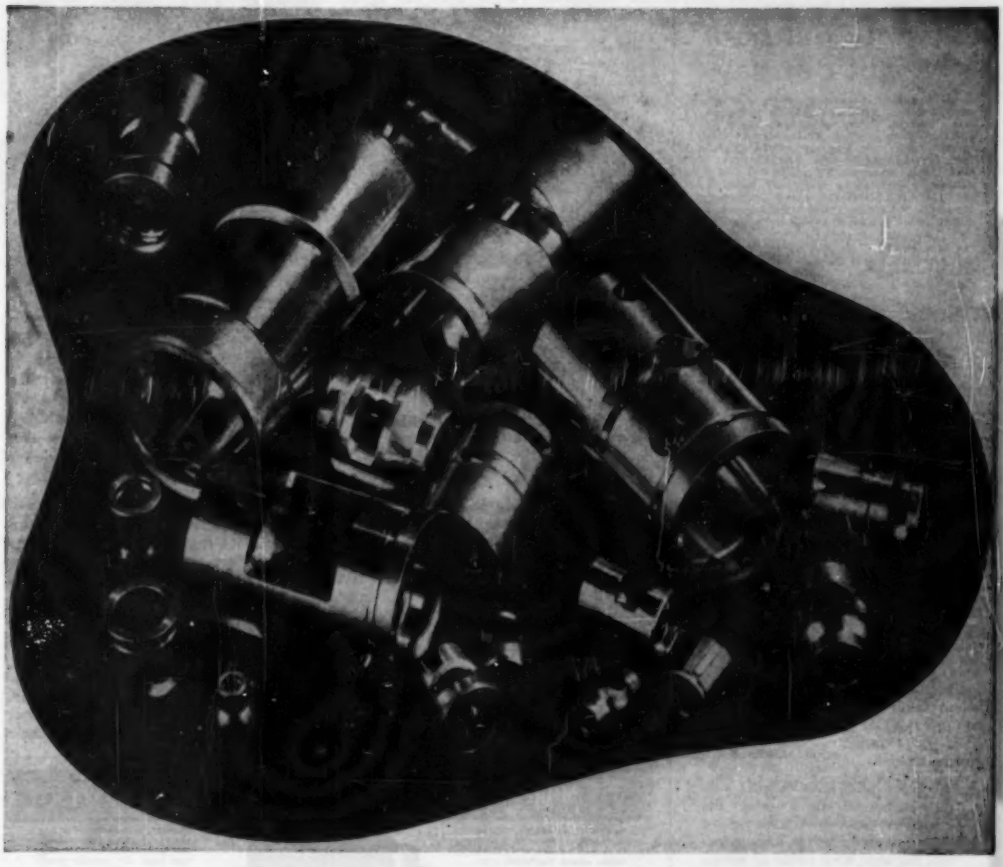

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TENNESSEE BEARINGS, INC.
417 Dale Avenue • KNOXVILLE, TENNESSEE

THE MERRICK

FEEDOWEIGHT

Reg. U. S. Pat. Off.

tells rate per hour —weight per day

A self-contained automatic conveyor scale, combined with automatic gate to give feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Feed rate may be varied. Large feed opening insures even flow. Uniformly feeds bulk material BY WEIGHT; and automatically totalizes weight of materials fed. Durable. Simple to operate. Rugged, heavy duty design. Slow moving parts means long life. Easy to install and maintain.

Manufacturers of

The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveying operation. Complete descriptive matter on request.

MERRICK SCALE MFG. CO.

Engineers and Mfrs. of Automatic Weighing Equipment

PASSAIC, N. J., U. S. A.

MOSEBACH

Headquarters for COMPLETE RAIL BOND SERVICE

Type MB-F All-Purpose Bond

Consider these advantages when you make MOSEBACH your Rail Bond headquarters:

1. 20 types of MESCOWELD Rail Bonds permit you to select the one best suited to your needs.
2. The patented Flashwelding process for attaching cable to terminal prevents oxidation at welded intersection and increases conductivity.
3. Immediate delivery of MESCOWELD Rail Bonds helps you avoid costly shutdowns.

Write for Details

Mosebach Electric & Supply Co.
3115 Arlington Avenue Pittsburgh 3, Pa.
HEmlock 8332

Among the Manufacturers

Coffing Hoist Co., Danville, Ill., has elected J. R. (Jim) Coffing vice president in charge of sales, advertising and general office administration. Mr. Coffing was first associated with the company at the age of 12 when he started as a clean-up boy. He worked his way up through various departments to become general sales manager prior to World War II, during which he served for 2½ yr in the South Pacific with the U. S. Army Engineers.

Major changes in the industrial sales organization of the Jeffrey Mfg. Co. recently were announced by J. A. Jeffrey, vice president and manager, conveyor division. Lincoln Kilbourne, formerly manager of sales, products engineering division, has become manager of sales, conveyor division. C. G. Hawley, district manager of the Jacksonville office, replaces Mr. Kilbourne. Paul Lawall, formerly district manager of the New York office, has returned to Columbus as manager of sales, general engineering division. R. W. Sweitzer, Philadelphia district manager, succeeds Mr. Lawall in New York and W. K. Myers, district manager in Boston has moved to Philadelphia. Paul Hendry, who has been working out of the Milwaukee office, has been made Boston district manager. Dan Knies and A. W. Lemmon have been named consultant sales engineers of the conveyor division in Columbus.

Frederick S. Marks, assistant sales manager, has been named sales manager of Rome Cable Corp., Rome, N. Y. Associated with the wire and cable industry for some 25 yr, Mr. Marks joined Rome Cable in 1945 as southern sales representative and moved to the main office in 1949 to assume executive sales work.

Harnischfeger Corp., Milwaukee, has appointed George W. Hoskins sales manager of its large excavator division, replacing Paul H. Hunter, recently transferred to P&H's San Francisco Branch. Mr. Hoskins has been district manager of the company's Philadelphia office since 1945.

Allis-Chalmers Mfg. Co. has appointed three sales representatives in district offices of its general machinery division, as follows: Joseph S. Quinn, St. Louis; Floyd B. Younginer, Chattanooga; and Malcom Jones, Denver. All three were members of the process machinery department before their

Diesel Training Continues

MORE THAN 10,000 MEN in mining, construction and other industries have taken advantage of the on-the-job training in operation and maintenance of diesel engines offered by the Detroit Diesel Engine Div. of the General Motors Corp. With two new mobile training schools recently put in service in Mexico and Canada, the company has nine units on tour to instruct diesel owners and operators. Individual company classes, as shown above, are kept small enough to permit ample instruction in engine tune-up and diagnosis.

MORE HAULAGE FOR 20% LESS BATTERY CAPACITY

Double knee-action; better tractability. Floating power; less power consumption. Quick acting footbrake—essential for quick stopping, especially behind loading machines. Brake shoes that follow wheels (due to knee-action). Adjustable Timken bearings throughout.

Husklest transmission in any storage battery locomotive. Oil-tight; foolproof. Use regular auto oil; change every 6 months. Strong. Simple design. Low maintenance cost. Backed by over 25 years of experience with Stuygo Battery locomotives.

GREENSBURG "MONITOR"

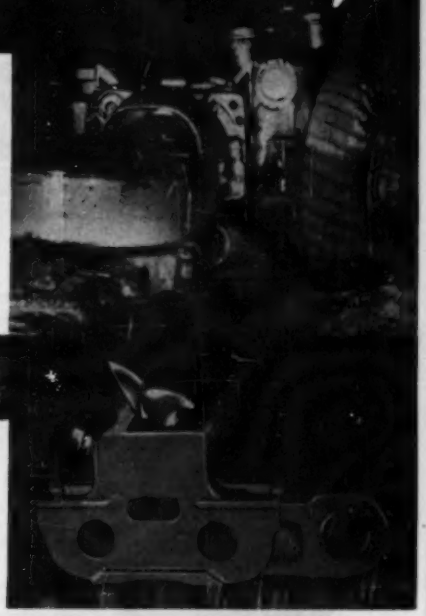
Franklin County Coal Corporation at Royalton and Herrin, Illinois, have 12 of our Monitor type, storage battery locomotives.

All Greensburg Locomotives are **CUSTOM-BUILT** *to your requirements*

THE GREENSBURG MACHINE CO. 101 STANTON ST GREENSBURG, PA.

PROX means SAFER! STRONGER! *faster cutting!*

KEEP YOUR CUTTER *ON THE JOB!*



with longer-lasting chains
and harder cutting bits,
precision machined by . . .

PROX

PROX DURABLE CUTTING CHAINS

This strapless designed cutting chain eliminates loss of time due to breakdown and repair. Prox chains are known for their longer cutting life! Parts are quickly and easily replaced!

PROX DROP FORGED BITS

The superiority of Prox bits has been proven through the years. These dependable bits are made of the finest alloy steel. Designed for higher stress values, Prox bits cut coal for the largest coal companies in the nation.

Prox engineers are always available to help you solve your cutting problems. Write today!

Now Available to the COAL INDUSTRY with either Round or Square Screen Openings

GILSON *Mechanical* TESTING SCREEN

The GILSON Testing Screen gives you prompt, accurate information about:

1. **Your finished product**
2. **Your raw material**
3. **Semi-processed material at any stage**

Knowing these facts about your product — the fluctuating changes in your operations enable you to operate your plant intelligently and more economically.

This machine is designed for the efficient sizing of test samples. It accommodates samples up to one cubic foot, making from two to seven separations simultaneously, in five minutes or less.

The screen trays and dust pan are sturdy, built to stand rough usage —will not bend or warp. Screen surfaces (ASTM standards) are held under tension by a tightening arrangement which insures proper vibration and permits easy replacement.

As standard screen trays are usually too large for testing very fine materials, an attachment (shown below, left) may be furnished for using eight-inch testing sieves in conjunction with the vibrating unit.

Where exacting specifications are required the Gilson Screen eliminates guesswork — avoids errors and provides facts which reduce operating delays.

For fast, accurate sizing from 4" to 200-mesh specify a Gilson Testing Screen.

GILSON SCREEN CO. BOX 186 MERCER, PENNA

Mack Disperses Plants

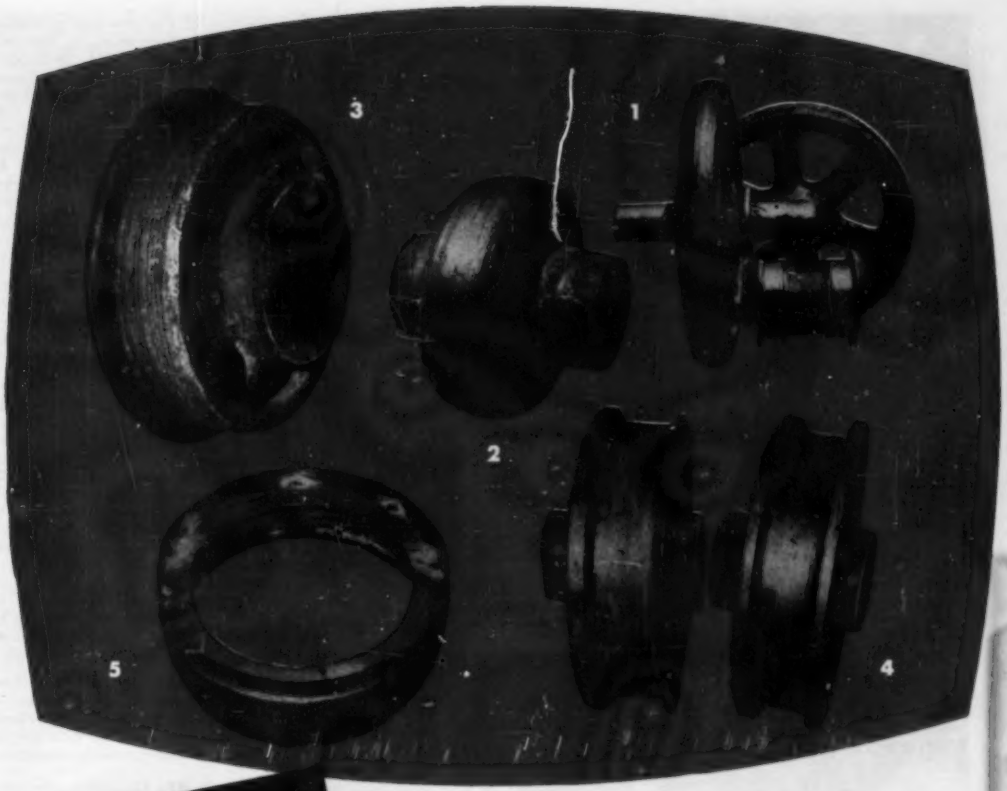
E. D. BRANSOME, president and chairman of the board of Mack Trucks, Inc., lays the cornerstone of the company's service parts division building in Bridgewater Township, N. J., as officials active in the government's program of industrial dispersion look on. The new facility is 9 mi from the nearest Mack plant, away from congested population and traffic areas and has no railroad connections. Speakers at the ceremonies paid tribute to the company's cooperation in planning the building's location and emphasized the important part played by trucking in both military and civilian defense.

new assignments. Alex J. Night, well-known Allis-Chalmers hoist engineer, is retiring after being associated with the company for over 42 yr. Mr. Night, who has been continuously associated with the A-C processing machinery department since 1909, will be available to the company on a consulting basis.

Arthur W. Bartling, formerly general manager of the Small Apparatus Div., has been named manager of product sales practices for the General Electric Co.'s Apparatus Sales Div., with headquarters in Schenectady, N. Y. Mr. Bartling has held various sales posts since joining the company in 1919.

Arthur I. Gibson has been appointed manager of the newly formed sheet and strip division of the general sales department of U. S. Steel Supply Co., Chicago. Mr. Gibson formerly was product representative of the company's sheet and strip division in Pittsburgh.

W. G. Turner, formerly manager of the southeastern region, Cummins Engine Co., Inc., has been transferred to Cleveland as manager of the company's Great Lakes region. G. W. Plondke, factory sales engineer, has been appointed assistant manager of the central region, with offices in Chicago.



1. SHOVEL IDLERS
Built up and hard-faced automatically with Stoody 105, this shovel idler and tractor roller are exceptionally smooth and long wearing.

2. SHOVEL ROLLS
Note the even deposit on this shovel roll. Stoody 105 will at least double its useful life—save hours of downtime.

3. MINE CAR WHEELS
Mine car wheels Sustain heavy wear from track debris. Stoody 105 retains size and roundness—keeps wheels on the job under difficult conditions.

4. CRANE WHEELS
Here: unprotected and hard-faced crane wheels are compared. Note wear evident on flange of unprotected wheel, left. Stoody 105 has held size on wheel at right.

5. BRAKE DRUMS
Surface of this brake drum is automatically hard-faced with Stoody 105 and subsequently machined. Resulting smooth surface far out wears unprotected drum.

STOODY 105 keeps the wheels of industry turning . . .

with less wear—less down time—less cost

Everywhere you look—in almost any industry, you see wheels in use. Some work *in* earth, others operate metal against metal . . . *but almost all are subject to heavy abrasion, loss of size, loss of life!* The quick, sure way to reduce wear . . . to keep these wheels of industry rolling . . . to cut maintenance is to hard-face with STOODY 105! It's a time-tried, proven procedure that saves equipment and dollars and reduces the need for hard-to-get replacements.

See your Stoody Dealer—600 in U. S. and Canada—for friendly help, or write direct.

STOODY COMPANY
11943 E. SLAUSON AVENUE, WHITTIER, CALIF.

STOODY 105

West Virginia gives you

6 ways to reduce coal mining costs

SWITCH STANDS—Tops in design, tops in service, tops in quality and variety.

TURNOUTS—Economical in use, economical in cost, easy to install and maintain.

STEEL TIES — Standard designs and weights. Save labor, save height, make good track.

RAILS—In ASCE sections and any lengths, high quality rail steel for durability.

PREFABRICATED TRACK—For permanent and temporary installations, easy to install.

ROOF BOLTS—The greatest forward step in safety and economy in mining in years.

Manufacturers of
RAILS and ACCESSORIES
TRACK WORK
STEEL TIES

West Virginia
Steel & Manufacturing Co.
Huntington, West Virginia

Election of two new vice presidents recently was announced by the Twin Disc Clutch Co., Racine, Wis. G. L. Shuman, new vice president-finance and secretary, had been secretary-treasurer of the company since 1943. R. G. DeLong, newly elected vice president, hydraulic division, since 1945 had been manager of the hydraulic division. W. F. Shurts, chief engineer, hydraulic division since 1942, has been named director of engineering.

John A. Rozo has been named director of exports, Dodge Mfg. Corp., Mishawaka, Ind. Mr. Rozo has been identified with export sales of various American manufacturers since 1929, except for a period of military service during World War II.

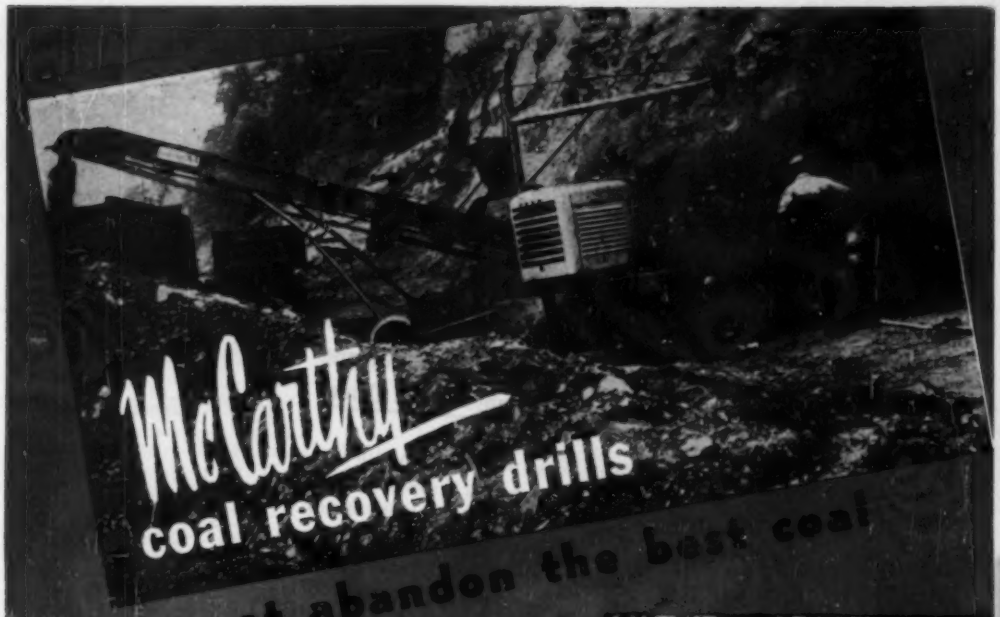
Frank J. Miller, general sales manager of the New Departure Div. of General Motors Corp., Bristol, Conn., has retired because of his health. With the company for 33 yr, Mr. Miller has been succeeded by Charles D. McCall, formerly manager of the division's regional office in Detroit. Lorne F. Lavery, assistant general sales manager, has transferred to Detroit to replace Mr. McCall, and Howard A. Offers, manager of the midwest regional office at Chicago, has become assistant general sales manager.

Whitney Chain Co., Hartford, Conn., has appointed Harold W. Beder, Jr. general sales manager. Mr. Beder formerly was associated with the McKinsey Co., management consultants.

Goodman Mfg. Co. last month established a new renewal-parts warehouse at Harlan, Ky., to serve mines in southeastern Kentucky, southwestern Virginia and eastern Tennessee. M. Curd Ferguson, a resident of Harlan, has been appointed manager of the warehouse, which is on U. S. Highway 119 at the L & N R.R. crossing.

Link-Belt Co., Chicago, has appointed Bert L. Pearce chief engineer of its Ewart plant in Indianapolis, succeeding Charles R. Weiss, who has retired after 42 yr of service. Russell T. Sweeney has been appointed assistant chief engineer. Mr. Pearce formerly was assistant chief engineer for product design and Mr. Sweeney assistant chief engineer for application engineering. Link-Belt also has announced the opening of a new factory branch store at 108 S. Fourth West Street, Salt Lake City 1, Utah, planned to provide better service to customers in Utah, southern Idaho and eastern Nevada. The new store and sales office is headed by Donald W. Newsome, district manager, an engineer transferred from the company's San Francisco plant, who will be assisted by Harry Hotchkiss, until recently on the Link-Belt staff in Spokane, Wash.

General Tire & Rubber Co., Akron,



McCarthy coal recovery drills

do not abandon the best coal

Heavy- Rugged Powerful

50th year

SALEM

1901-1951

The McCarthy Coal Recovery Drill starts in where the shovels leave off . . . in those rich veins which have been untouched because of too costly overburden removal. The McCarthy Drill bores horizontally or at an angle . . . mining and loading in one continuous operation.

Consider the operation illustrated here: a 30-inch McCarthy drill is shown at work on the coal drilling operation of L. E. Grant near Edwight, Raleigh County, West Virginia. The huge power-driven drill bores the coal out of the rich seam after stripping has mined as much of it as it is profitable to recover that way. The 30-inch drill comes in six-foot sections, and 17 of them are used at this particular operation to drill a hole 102 feet back in the mountain. A three-man crew can produce 90 tons of clean coal in an eight-hour shift, a portable conveyor being used to load the coal into trucks. Grant has two such drilling outfits at work near Edwight. Bish Equipment Company, McCarthy drill distributor in the two Virginias, has sold sixty drills for this unusual method of coal mining.

McCarthy drills can be used for strip or deep mine operations. Available in diameters of 12, 18, 20, 24, 30, 36, 42 and 48-inch.

Let us have your inquiries which will be referred to our nearest distributor. Write today for the full story on the revolutionary McCarthy Coal Recovery Drill.

MANUFACTURED BY

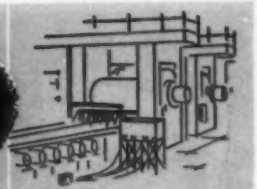
SALEM

THE SALEM TOOL CO.

763 S. ELLSWORTH AVE. • • SALEM, OHIO, U. S. A.

PRINTING INDUSTRY

It's the EXPERIENCE that counts...



STEEL INDUSTRY

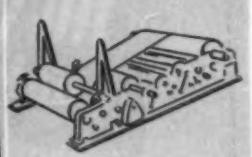
RUBBER INDUSTRY

PLASTICS INDUSTRY

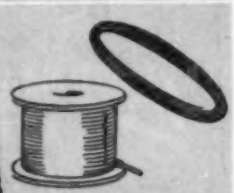
Reliance V★S is the result of nearly 50 years' experience in the engineering and application of Adjustable-speed Drives

V★S Drive provides an unlimited range of speeds from A-c. circuits. In addition, V★S offers controlled acceleration and deceleration; slow speed for jogging, inching or creeping; fast, smooth reversal at any point desired and other specialized functions to suit particular applications. Safe, simplified control saves man hours—reduces operator fatigue. Centralized operator's station for the control of one or more drive motors can be located at any convenient point. Write today for *new* V★S Drive Bulletin D-2311.

FOOD INDUSTRY



PAPER INDUSTRY



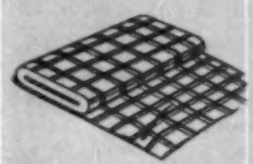
WIRE AND CABLE INDUSTRY

MINING INDUSTRY

PROOF of PROGRESS!

Just after the turn of the century, the lathe above made news with its adjustable-speed Reliance Armature-shifting Motor. Modern lathes (right) have built-in Reliance V★S Drives to provide control of all functions of spindle and speeds.

CHEMICAL INDUSTRY



TEXTILE INDUSTRY

METAL FABRICATING INDUSTRY

RELIANCE ELECTRIC AND ENGINEERING CO.

1015 Ivanhoe Road, Cleveland 10, Ohio • Sales Representatives in Principal Cities

has announced the expansion and reorganization of the truck, tractor and industrial sales departments and the coordination of all sales under the newly-created commercial sales division. Karl A. Dalsky, manager of truck tire sales at General for the past 20 yr, has been named to head the new division as commercial sales manager. There will be five distinct marketing activities under the jurisdiction of the new division, each headed by an assistant manager. J. A. Beckett, recently transferred from the engineering division, will be in charge of contractor and construction sales, including mining. Robert Moran, in charge of General's industrial tire sales for some years, will be given the added responsibility of creating and developing the market for General's new air suspension for truck trailers.

Sterling Steel Casting Co., E. St. Louis, Ill., has named the Marshall Equipment Co., Huntington, W. Va., its representative throughout West Virginia and eastern Kentucky.

Koehring Co., Milwaukee, recently appointed as exclusive distributor and representative for most of Indiana the A. F. Deaney Co., Indianapolis. In addition to Koehring products, the firm also represents the C. S. Johnson Co., Champaign, Ill., and Parsons Co., Newton, Iowa, both Koehring subsidiaries. A. F. Deaney is president of the organization and Ralph Riddle is in charge of sales.

Part of the old Phillies Ball Park will be improved with a $600,000 commercial building, it has been announced by Benjamin Baldwin, president and general manager of Stonehard Co., Philadelphia. The company will erect a one-story 42,000-sq ft building on the site to house its offices, warehousing and manufacturing facilities.

Raybestos-Manhattan, Inc., Passaic, N. J., has started operations of its new Wabash Div. with a 70,000-sq ft plant newly constructed to manufacture sintered-metal products for the military defense program. Two units have been built on a 62-acre tract, a main building containing manufacturing facilities and offices and a service building housing the power plant. The company plans to expand the division over a period of years to produce various other sintered-metal, asbestos and rubber products.

Atlas Powder Co., Wilmington, has appointed James A. Gilruth manager of its advertising and sales promotion division. Mr. Gilruth formerly was associated with the company for 10 yr until 1946, when he became sales promotion manager of the Storage Battery Div. of Philco Corp., later Gould-National Batteries, Inc. Since June, 1950, he has been a senior editor on the staff of Harry W. Smith Inc., New York technical publicity firm.

EASIER
DISPOSAL
of silt,
coal refuse!

MORRIS
TYPE R SLURRY PUMP

Saves you the high cost of trucking refuse away!

In coal washeries and processing plants, Morris Pumps have been saving coal operators thousands of dollars in waste disposal operations. They eliminate expensive truck maintenance . . . trucking labor . . . and in many cases, they eliminate the building of roads for trucks to travel.

Morris pumping installation is simple in design . . . low in cost

Morris furnishes pumps of various types depending upon the operating conditions . . . type of refuse to be handled . . . static discharge head . . . length of pipe line through which refuse is discharged.

Morris also recommends the size of piping best suited for the job. Pipe laying expense can be kept at a minimum by using light weight abrasion resisting pipe, easily and quickly coupled . . . easily moved . . . suitable for uneven terrain.

REDUCE YOUR OPERATING COSTS—NOW!
Morris Pumps are ideally suited to the removal of fine silt and other types of refuse. They're easy to install . . . easy to maintain . . . easy to dismantle.

Write today for full information. Read how Morris' wide experience of 83 years in building and installing pumps and dredges can save you money and refuse disposal headaches. We'll also send you names of mines now using Morris installations.

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Branch Offices in Principal Cities

MORRIS Centrifugal Pumps

BITUMINOUS

Security with Service

BENEFITS THE MINING INDUSTRY

OPERATOR

WORKER

The Bituminous slogan, "Security with Service," applies to all phases of mining operation . . . to operators and workers alike. It keynotes the Bituminous Safety Engineering program, consisting of regular mine inspections . . . analysis of mine hazards . . . survey recommendations . . . accident prevention activities . . . reduction of operating expenses resulting from accidents . . . and establishment of production efficiency. Bituminous Safety Engineers are constantly alert to the hazards that might affect Bituminous Workmen's Compensation policyholders . . . and to forestall these hazards before they take shape. Thanks to their training and skill, Bituminous' slogan is a "living" phrase, packed with meaning for the mining industry.

BITUMINOUS CASUALTY CORPORATION

ROCK ISLAND, ILLINOIS

OVER 30 YEARS OF SERVICE TO THE MINING INDUSTRY

Association Activities

The New River Coal Operators' Association, at its annual meeting held in Mt. Hope, W. Va., Oct. 25, re-elected all of its officers as follows: president, S. Austin Caperton, president, Slab Fork Coal Co.; vice president, L. C. Campbell, vice president, Coal Div., Eastern Gas & Fuel Associates; secretary and labor commissioner, S. C. Higgins; and treasurer, P. M. Snyder, EG&FA.

Paul D. Ritter, president of the Red Jacket Coal Corp., was elected president of the Coal Operators' Association of Williamson Field at the annual meeting held Oct. 26 in Williamson, W. Va. Other officers named were: J. M. Tulley, vice president; J. D. McLaughlin, treasurer; and Joseph J. Ardigo, re-elected secretary for his 23d term. At a meeting of the **Upper Buchanan Smokeless Coal Operators' Association,** held at the same time, the following officers were elected: C. A. Hamill, president; J. W. Strickler, vice president; and Mr. Ardigo, secretary-treasurer.

Alfred L. Howes, president of the Howes Mining Co., was re-elected president of the Central West Virginia Coal Producers' Association at its annual meeting and banquet held in Clarksburg. John C. Southern is secretary of the organization.

Dennis J. Keenan, superintendent of the Sterling Coal Co., Barnesboro, Pa., was re-elected to his 15th term as president of the North Cambria Coal Mining Institute at the 36th annual meeting held in October.

Harlan County Coal Operators' Association, at its annual meeting Nov. 14, elected as president, J. S. Greene, president, Garmeada Coal Co.; and as vice president, M. M. Ellison, president, Southern Kentucky Coal Co. George S. Ward was re-elected secretary-treasurer. Named to the board for the coming year were: Pearl Bassham, Harry M. Bennett, Kenes Bowling, S. J. Dickenson, F. L. Dupree, Charles S. Guthrie, L. P. Johnson, D. A. Perkins, R. C. Scott, J. E. Taylor, and B. W. Whitfield III.

Mineral Producers' Association elected Alan R. Davidson, of the Twin River Co., West Elizabeth, Pa., president of the association at an organization meeting of the board of directors held Nov. 10. Mr. Davidson succeeded R. R. Bowie, Bowie Coal Co., who had held the post since 1946. R. S. Walker, Bradford Coal Co., was re-elected vice president, and F. H. Mohney was re-elected secretary-treasurer.

The Coal Trade Association of Indiana, at its annual meeting in Indianapolis Nov. 9, elected R. G. Nunn, vice president of the Hickory Grove Coal Mining Corp., president of the organization. J. W. Morgan, president, Ayreshire Collieries Corp., was elected vice president, and C. C. Lydick was re-elected managing director.

Southern Appalachian Coal Operators' Association re-elected Charles R. Griffith president at its annual meeting in Knoxville Nov. 16. S. G. Moore and Earl Griffith were re-elected vice presidents and C. W. Davis was named secretary.

News Briefs . . . From p 138

Pa., had been earlier announced by the company, which emphasized that present tenants would be given first opportunity to purchase them on as convenient terms as possible. At the time of the picketing, the real estate firm handling the sales said that 123 of the homes had already been sold at an average price of $4,000, which it said was under the appraisal value. The women protested that many families had found it "impossible" to get the $900 down payment. The following day, the local voted to return to work and put the matter in hands of union officials.

New Priority for Coal Mines

A new system of self-rating priority assistance to solid-fuels producers in obtaining materials for maintenance, repair and operating supplies (MRO) and for minor capital additions was provided in NPA Order M-87 issued Oct. 24 by the National Production Authority. Affecting coal mines, coal preparation and processing plants, merchant and integrated coke plants, the order requires a producer to establish a quarterly quota based in general on his rate of expenditures for MRO in a base period consisting of the last 9 mo of 1950. Copies of the order have been mailed to all producers by the Defense Solid Fuels Administration and requests for additional copies or interpretation should be addressed to the DSFA.

TVA Use of Gas Prohibited

Permission for the TVA to use natural gas for boiler fuel at its Johnsonville plant, one of four steam plants now under construction, was refused Nov. 6 by the Federal Power Commission. While the ruling applied to only the one plant, it was expected to set a precedent for other TVA operations. While there might be "relatively small money gains" from using gas, the FPC said, there seems to be no reason why adequate supplies of coal should not be available for the Johnsonville plant, as well as other TVA steam plants, and gas is not necessary to insure continuity of supply, as the TVA had maintained. It pointed out that the TVA had never had less than 50 days' supply of coal on hand and that recent solicitations for coal bids had produced offers of greater tonnages than desired by the TVA.

EQUIPMENT APPROVALS

Seven approvals of permissible equipment were issued by the U. S. Bureau of Mines in October, as follows:

Joy Mfg. Co.—Type 2SC-3D battery-operated shuttle car; three 5-hp motors, 90 v, DC; Approval 2-814; Oct. 2.

Jeffrey Mfg. Co.—Type 70-UR universal cutting machine; two motors, 50 and 25 hp, 415-440 v, AC; Approval 2-815A; Oct. 9.

Albert & J. M. Anderson Co.—Distribution box; single outlet, 220, 440 and 550 v, AC; Approvals 2-816 and 2-816A; Oct. 18.

Goodman Mfg. Co.—Type 274-C-35 cable-reel shuttle car; five motors, three 5 hp, one ½ hp, and one torque motor, 250 v, DC; Approval 2-817; Oct. 29.

Goodman Mfg. Co.—Type 374-34 cable-reel shuttle car; three motors, two 7½ hp and one 5 hp, 250 v, DC; Approval 2-818; Oct. 29.

Goodman Mfg. Co.—Type 375-34 cable-reel shuttle car; three motors, two 7½ hp and one 5 hp, 250 v, DC; Approval 2-819; Oct. 29.

Joy Mfg. Co.—Type WK83RT Model 240 air compressor; one 50-hp motor, 250 v, DC; Approval 2-820; Oct. 30.

And For Your Information

Again reaffirming its faith in coal, the Norfolk & Western Ry. recently announced that it would soon begin construction of 15 modern coal-burning switching locomotives, at a cost of about $1,450,000. The new units will be identical to another group of 15 just completed at the company's shops in Roanoke.

Some 200 low-cost homes to be built in Superior, Wis., have been designed to burn bituminous coal for central heating. Local CHS and other industry representatives presented economic data to housing authorities on which the specification of coal heat was based.

Mining losses incurred while operating under government seizure are not reimbursable, the U. S. Comptroller ruled last month. A claim of $6,074,500 for salary and depletion expenses during the 1946 seizure was made by W. H. Day, operating a mine at Concord, Tenn. His argument that he continued operation at a loss because of government pressure was rejected, since, according to the comptroller, he was not ordered to operate, but only urged.

Two new pilot plants are being tested at the Synthesis Gas Branch of the USBM at Morgantown, W. Va. Each of the units, which have a capacity of 500 tons of coal an hour, was pre-

CUT COSTS OVER 60%

Pressure-Creosoted Oak Ties Used in a Coal Mine's Main Haulageway.

● With today's high-speed, heavy-tonnage haulage, there's no place for *bad* ties. They represent a serious hazard. And frequent replacements run into too much money.

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ceded by smaller units in which gasification of bituminous coal from West Virginia and Wyoming, lignite and Pennsylvania anthracite were studied.

Twelve men were killed Oct. 31 in an explosion in the United Gas No. 1 mine of Truax-Traer Coal Co., United, W. Va. In its investigation, the USBM cited as the probable causes of the blast improper blasting practices, failure to clean up fine coal and coal dust, and insufficient rock-dusting.

Foreign Developments

GREAT BRITAIN—Although it is expected that Britain's new Conservative government will seek to remove the iron and steel industry from nationalization, there is no indication that there will be any change in public ownership of the nation's coal mines. While the government has talked about decentralizing the coal industry, there has been no definite program put forth and a debate in the House of Commons early last month made it appear that it would not end nationalization. The government announced also that it would have to reduce the coal available for household use in the next 3 mo as there is a shortage of some 2,000,000 tons.

FRANCE—At least 80,000 French miners, or about half of the nation's total, went on strike Nov. 14 on orders of Communist-dominated locals. The stoppage was in protest of a recent government order requiring miners to pay 15% of the price of drugs and medicines. They had previously been furnished free under the social security in effect in the area.

AUSTRALIA—An Australian-German engineering firm was scheduled to begin operations last month to mine over 11 million tons of coal near Singleton, New South Wales, in what it hoped would be the first stage of its operations in Australia. The German firm, Hochtief, Ltd., of Essen, was expected to import about $1 million worth of mining equipment and reportedly was also seeking to interest Australian firms in German equipment, in competition with American and British machinery.

AFRICA—Proving of some 40 million tons of workable coal in the Ruhuhu River area of South West Tanganyika has been announced by the Colonial Development Corp. The gross tonnage found is said to exceed 200 million tons, though not all minable.

COAL AGE INDEX

For your convenience, COAL AGE's annual index, covering all 1951 issues, appears on pp 191 to 196 of this issue. To help you find the information you may be seeking, articles published during the year are classified by subject, with additional listings by mine, company and author.

New Books for Coal Men

What to Do With Strip Spoils

Strip-Mined Lands of the Western Interior Coal Province, by Nelson F. Rogers. What is being done with the 3,000 acres per year of land that is being stripped in Arkansas, Missouri, Kansas and Oklahoma? In this booklet, the Central States Forest Experiment Station, U. S. Department of Agriculture, gives the answer and charts a course for future study and action. *Research Bulletin 475, College of Agriculture, University of Missouri, Columbia, Mo. 55 pp. 6 x 9-in; paper. No price quoted.*

New Fuel Aid to Industry

Application of Overfire Jets to Prevent Smoke From Stationary Plants. This booklet, a revision of BCR Technical Report VII, is the first of a series of new publications called "BCR Aids to Industry." Aim of the series is to help coal users get maximum satisfaction and to help coal producers expand their markets. *BCR Aid to Industry 500-300. 24 pp. 8½ x 11-in; paper. 50c (40% discount to BCR members), Bituminous Coal Research, Inc., Pittsburgh 22, Pa.*

Electrical Accidents

Physiological Aspects of Electrical Accidents in the Coal Mining Industry, by S. J. Davenport and G. G. Morgis. How power currents affect human beings, how men react to various currents and how electric shock can be treated. The booklet also discusses safety measures and methods of preventing electric shocks in mines. *USBM, I. C. 7620. 19 pp. 8 x 10½-in; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Inspecting Roof Bolts

Suggestions for Inspection of Roof-Bolt Installations, by Edward Thomas. Though roof-bolting has made big strides, each mine still must be made a special case when bolts are installed and inspected. Even so, there are some visual and mechanical tests for determining the effectiveness of bolts. This booklet lists these tests. *USBM, I. C. 7621. 6 pp. 8 x 10½ in; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13.*

Heating All-Electric Homes

The Steam-Generating Station as a Source and Sink for the Heat Pump, by J. A. Eibling and B. A. Landry, Battelle Memorial Institute. This is a report of studies in residential group heating sponsored by BCR which evaluates the steam-generating station as a factor in heating and cooling groups of all-electric houses. Advantages and limitations are compared, using specific examples for clarity and as an aid in estimating the feasibility of the application. Single copies free; in larger quan-

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Illinois Mining Group Has 59th Annual Meet

Begin on p 136

belt itself, including handling and uncrating, feeding into the slope, preparing the belt ends and vulcanizing, was less than 200 hr, with 2 to 12 men working depending upon the type of work being done.

Answering a question by Davis Read, consultant, Chicago, as to whether the head pulley is rubber-covered, Mr. Thornton replied that it is lagged.

How College Training Helps

College training for young men intending to enter mining engineering provides several benefits, said Rodney D. Caudle, graduate student in mining engineering, University of Illinois, who spoke on "What My Years of Study at the University Meant to Me." Among these benefits are: (1) learning to use brains and improve thinking; (2) learning to read understandingly, accurately and fast; (3) grasping the facts of basic sciences; (4) learning where to find answers if they are not at hand; (5) acquiring a wide range of engineering skills applicable to mining; and (6) gaining practical experience through summer employment in the mines.

How Defense Spurs Coal

Demand for coal is expanding now because of the need for maintaining an effective balance between fuel resources and their use, and there is a tremendous potential need for coal in the new program for synthetic liquid fuels now under development, said C. W. Connor, administrator, Defense Solid Fuels Administration, Washington, D. C. Mr. Connor, accompanied by William Hahman, deputy administrator, and Clyde Woosley, head, Equipment & Materials Division, DSFA, was the final speaker at the morning session.

Noting the drain on those fuels in which the Nation's position is relatively weak, namely oil and natural gas, Mr. Connor pointed out that we now require from 850,000 to 930,000 bbl of oil imports per day and that much of our natural gas, though in short supply, is being piped to areas where coal abounds. These facts, coupled with unlimited coal reserves and the ability of the coal industry to expand its production easily, demand a national fuels policy that will guard the national interest.

Evidence of growing concern over the Nation's fuel-use pattern is found in the current study of national energy needs and reserves being conducted by a Senate committee, the

oil-pricing policy of the Office of Price Stabilization and that agency's urging that industrial customers turn to coal, the action in February by the Munitions Board urging military installations to give first preference to coal, and the support by the DSFA and the Department of the Interior for development of a synthetic-liquid-fuels industry, which also would produce critically needed chemicals.

Experimental runs at the hydrogenation plant at Louisiana, Mo., have produced 3.15 bbl of oil for each ton of moisture-free coal processed, and more than 300,000 gal of liquid fuels produced at the plant have met severe military tests, Mr. Connor said. Over a period of years, sustained production of oil from coal would require about 2.8 lb of steel, including coal-mine requirements, for each barrel of product made by hydrogenation, whereas production and refining of petroleum requires about 4.6 lb of steel per barrel of product. In addition, a 30,000-bbl per-day hydrogenation plant would increase the Nation's benzene output by about 20%, phenol by 11% and substantial quantities of toluene and xylenes.

Possibilities of increasing coal use substantially are as follows, Mr. Connor said:

1. Construction of a coal hydrogenation plant at Institute, W. Va., by Union Carbide & Carbon Corp., now underway.
2. Proposed construction of standby manufactured-gas plants alongside natural-gas pipelines to augment supplies of natural gas.
3. Proposed construction of fuel-fired electric plants in the Pacific Northwest.
4. Increasing use of coal by steam electric plants.
5. Extensive manufacture of agricultural ammonia from coal.
6. Development of the coal-fired gas turbine for locomotive and stationary use.

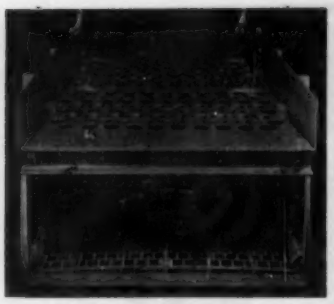
DSFA's primary objective is to prevent problems from arising, if possible, rather than to institute extensive controls, Mr. Connor concluded.

Designing Heavy-Media Plants

Simplicity is the trend in designing heavy-media coal preparation plants, said R. C. Woodhead, McNally Pittsburg Mfg Corp., Pittsburg, Kan. Mr. Woodhead was the first speaker on the afternoon program, which was arranged entirely by the Illinois Society of Coal Preparation Engineers and Chemists. Component units are so assembled as to provide utmost efficiency together with minimum maintenance and minimum labor. Factors in the efficiency of heavy-media plants are as follows:

1. The separating vessel—It should reproduce laboratory studies as closely as possible.
2. The medium—It must be carefully handled to prevent loss. It must not corrode pipes and vessels. It must

For heavy-duty vibrating screens



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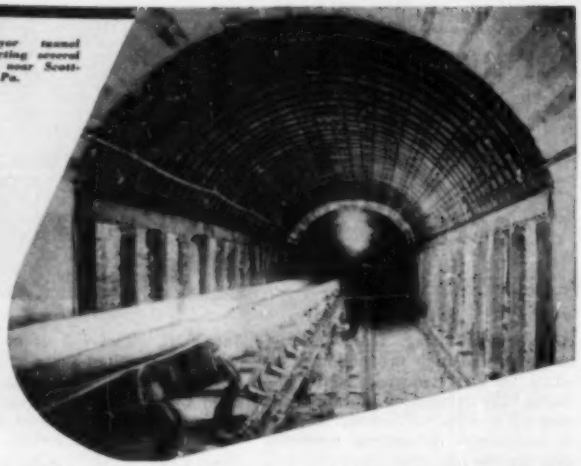

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be finely ground and must not settle out too rapidly or become viscous.

3. Density—It must be carefully controlled to obtain accurate separation. The system must be designed accordingly, with provision for recovering the medium and regenerating the system.

4. Drainage and recovery system—Magnetite, because it lends itself well to both magnetic and pre-settling recovery, is an ideal medium. In spraying the coal to recover the medium, a dilute-medium spray followed by a clear-water spray is practicable.

5. Introduction of raw coal into the separating vessel—If feed is not carefully designed, slate or other high-gravity impurities may be trapped at or near the surface.

6. Pumping and circulation—Heavy-media fluids require more power for pumps. Pipes should be laid on a slope to avoid clogging.

Cleaning Streams and Air

Stream and air pollution may be caused by coal and pyrites, said Dr. Louis C. McCabe, USBM, Washington, D. C. If the soil on which coal wastes are stored is alkaline, or if the stream into which wastes drain is alkaline, harmful effects may be neutralized. But this condition does not often exist, resulting in the destruction of fish and the bacteria that make streams self-cleaning. In addition, the presence of pyrites and sulphur makes gob piles ignite spontaneously, discharging sulphur dioxide and smoke that destroy plant life and create a nuisance to nearby residents.

Although air and stream pollution can be reduced by careful piling and compacting of gob piles, Pennsylvania is the only state that now has a statewide law governing air and stream pollution. Elsewhere, along the Ohio River, for example, stream pollution is being controlled by interstate action, with assistance from the USBM.

Recovery of sulphur from coal wastes may possibly pay all or part of the cost of air and stream cleanliness, Dr. McCabe explained. Demand for sulphur now is growing and may double within the next 25 yr. Ways and means of recovering sulphur already are known. The question now is one of economics. The answer lies in freight rates on sulphur and in the going price for sulphur on the Gulf coast and in agricultural regions near coal fields.

Recovery of fine coal from a sludge pond at the Fidelity mine, United Electric Coal Cos., DuQuoin, Ill., was described by Raymond Kloepper, preparation expert in charge of the fine-coal plant at that mine. This plant was featured in *Coal Age*, November, 1951, p. 94. The consistently clean, low-ash fine coal produced there is gradually overcoming the former sales resistance to fine sizes, Mr. Kloepper said.

How to Recover Sulphur

Pyrites have been successfully re-

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covered in commercial quantities, along with fine coal, by the Pittsburg & Midway Coal Mining Co., said Elmer Citron, of that company. The company started experiments in 1926 to recover coal and pyrites and solve refuse-disposal problems. A pilot plant was built in 1933 and studies were made of refuse piles, recovery methods and experimental jigging. A full-scale commercial plant was built in 1936 and was sold several years later to Monsanto Chemical Co.

The Pittsburg & Midway plant received refuse in various sizes, consisting of stone, slate, clay, coal and pyrites. The refuse was crushed in several stages down to ¾-in and then was washed to recover the coal. Jigs were used extensively on the hutch material to treat middlings. Refuse, being mostly pyrites, was put through a series of jigs.

The pyrite-cleaning jigs produced a clean pyrite from the first three cells, plus a middling product, plus a tabling product which was largely crushed pyrites. The tables in the circuit turned out a waste tailing plus a dirty pyrite. This latter was fed to a final table which delivered a fine-size cleaned pyrite.

Recovery from the gross feed totaled 20 to 25% clean coal and about 18% clean pyrites. The coal averaged 8 to 10% ash and 3% moisture. The plant used 7,300 gpm of water, employed six men and, in 1936, cost $170,000 to build, including charges for research and development.

Where to Find Sulphur

Recent discoveries of extensive sulphur deposits have not changed the need for a bigger sulphur-producing industry, said Dr. W. H. Voskuil, Illinois State Geological Survey, Urbana, Ill. But development of such an industry may mean higher costs, he warned. Among sources that can be exploited to supplement or substitute for present supplies of sulphur are: "sour" gases, smelter gases, stack gas, coke-oven gases, pyrite deposits and "coal brasses." Within Illinois, where about 24% of the Nation's sulphuric acid is produced and consumed, supplemental sulphur may be obtained from four of these sources; namely, "coal brasses," stack gases, refinery gases and coke-oven gases. In fact, there is enough sulphur in these sources to fill all the state's needs.

As far as coal is concerned, large quantities of sulphur could be extracted from refuse piles which, in Illinois, average about 12% sulphur, Dr. Voskuil pointed out. In addition, if the 1% of sulphur commonly contained in Illinois and Indiana coals could be extracted from stack and coke-oven gases, it would total about 430,000 tons of pyrites per year. Two problems still would remain, however: (1) a satisfactory method of making sulphuric acid from pyrites contaminated with carbon and (2) bringing costs down to a competitive level with other sources of sulphur.

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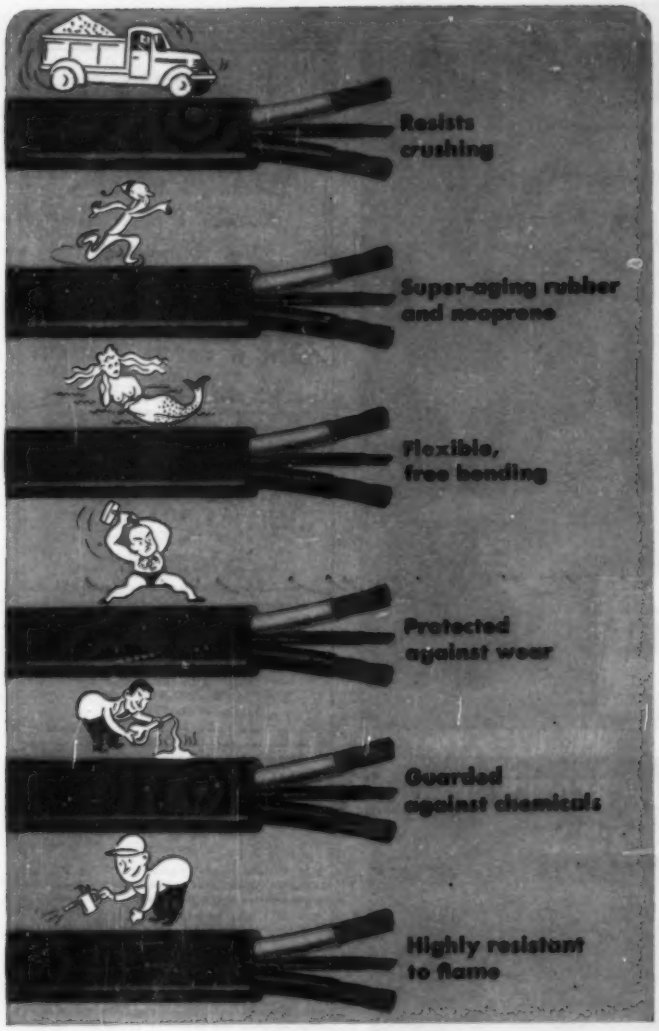

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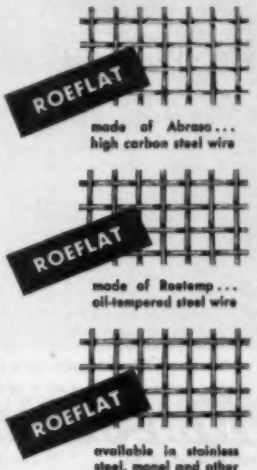
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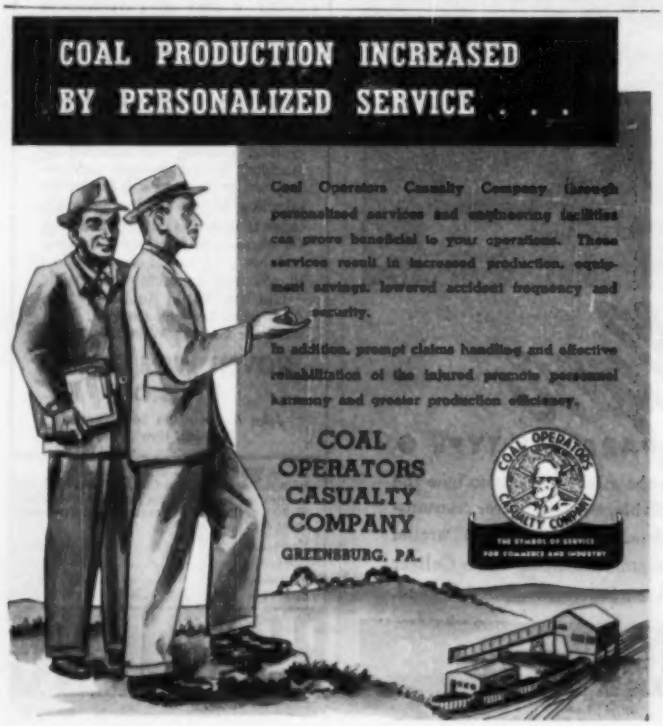
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YOUR card here builds prestige for you and helps to make your name familiar in the field. The cost is extremely small in proportion to its value as a business aid.

Mining Machine Resistor

GUYAN Mining Machine Resistors are designed and built to give trouble-free resistor service. Note the light-weight, sturdy, fabricated framework of angle steel . . . corrosion-resistant chromium alloy steel coils . . . clamp type bronze terminals for rigid connections.

GUYAN Resistors are available for all the popular types of mining machines and require no alterations — merely remove the old unit and replace with the new GUYAN Resistor.

GUYAN supplies a complete line of resistor products — Consult us on your resistor problems.

GUYAN RESISTORS

assure dependable mining machine production

GUYAN MACHINERY COMPANY
LOGAN . . . WEST VIRGINIA

Write today for the new D-A folder on current engine lubrication problems and solutions.

D-A LUBRICANT COMPANY, INC. • Indianapolis 23, Indiana

THURMAN PORTABLE TRUCK SCALE

- Platform Lengths 18, 22, 24 & 30 ft.
- Capacities 20, 25 & 30 Ton

The Scale that can be moved from job to job

Special sizes made to meet special requirements

Wide Steel Bases — support scale — require no concrete footings. Easy-to-read chrome plated weighbeam with vital parts electroplated against corrosion.

Accurate and Portable — This scale can be transported from job to job by removing 6 nuts which hold side arms in place. The rest of the scale can be lifted as a unit. Once located, it can be readied for use in minutes.

THE COMPLETE THURMAN LINE INCLUDES:

- Pit Scales up to 50-ton capacity
- Pitless Scales
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This and other weighing equipment in sizes to fit your requirements.

THE THURMAN MACHINE CO.—Scale Division

156 North Fifth Street — *Established 1918* — *Columbus 15, Ohio*

"Sutton" SAND DRYING STOVES

The Standard for Over Forty Years

Burns Any Type of Fuel

The "Sutton" Sand Dryer may be fired with any type of fuel. While most "Sutton" Sand Dryers are equipped to burn coal, they can be furnished with burners for natural gas or fuel oil.

"SUTTON" FEATURES

- Simple in operation
- No skilled labor necessary
- Made in four sizes
- Lowest original cost
- Economical upkeep
- Topmost efficiency

SATISFACTION GUARANTEED

Catalog and Prices sent upon request

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"We look into the earth"

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OIL TREATMENT

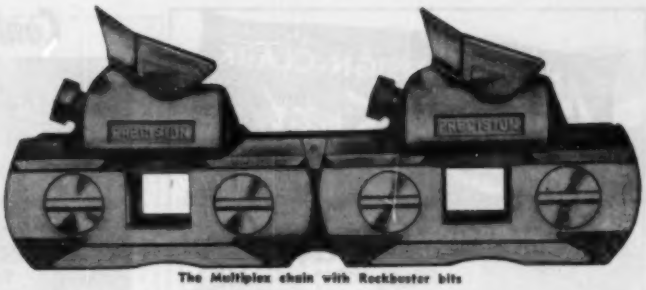
FOR BETTER DUST CONTROL

Write for Details

VIKING MACHINERY SALES CORP.

JACKSON, MICHIGAN

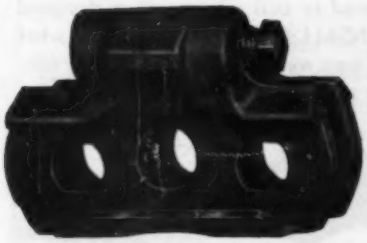
Actual Size
ROCKBUSTER
BITS



The Multiplex chain with Rockbuster bits

PRECISION CHAINS & BITS ARE SETTING NEW RECORDS—

One user found 40% less power required, another found less than half the minus ⅛" fines compared with other factory type bits, and many have found Precision chains stay on the job twice as long—— There are sound mechanical reasons — new catalog tells why — write for it.

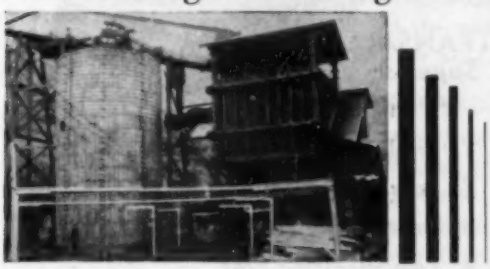


The Precision standard chain

PRECISION CHAIN COMPANY TERRE HAUTE, IND'ANA

Distributors: Pittsburgh, Huntington, Denver, Birmingham, Christopher Ill., Helper Utah, Terre Haute.

NEFF & FRY Silo at Aflex Mine
for Loading and Storing Coal



At the Aflex mine of Leckie Smokeless Coal Co., high-content raw feed is plowed off the conveyor belt into the Neff & Fry Silo shown in the photo. When the feed is mostly debris, the plow is raised and the refuse goes to the wooden bin.

The 20′ x 37½′ silo has sufficient capacity to hold three hours' mine output, standby storage against delays. Coal is loaded into cars from the chute by gravity.

This is another of the many interesting installations we have made at coal mines. We'll be glad to tell you about them; also to study your particular problems. **Write, wire, or phone us.**

THE NEFF & FRY CO. • 228 Elm St. Camden, Ohio

SUPER-CONCRETE STAVE STORAGE BINS ◆ NEFF & FRY

The NORTH BRITISH 'MINER'

100 h.p. *Flameproof* DIESEL MINES LOCOMOTIVE.

The smallest, most powerful Diesel (Mines) Locomotive of its type, is a self-contained unit which occupies no more space than the standard mine tub. It is speedy, simple and safe to handle; gives complete visibility for driving; certified flame-proof for engine induction, exhaust and electrical fittings. Completely efficient and reliable in constant operation, the "Miner" weighs about 15 tons in working order and is available in three gauges:—2ft. 6ins., 3ft., and 3ft. 6ins.

The low operation and maintenance costs of the North British "Miner" have been substantially reduced by embodying (1) The Voith-North British Turbo Transmission and (2) Timken Roller Bearing Axle Boxes as standard practice.

The all-fluid VOITH-NORTH BRITISH TURBO TRANSMISSION has the following outstanding features:—

No gear changing, no clutch operation, Throttle control only, completely automatic, characteristics of Electric Drive, robust and simple construction, conservatively rated engine, substantial economy in maintenance.

The North British "Miner" is in service with the following mines in Canada: *Dominion Coal Company, Nova Scotia Crows Nest Pass Coal Company, Fernie, British Columbia Lethbridge Collieries Limited, Lethbridge, Alberta*

NORTH BRITISH LOCOMOTIVE Co. LTD GLASGOW

NEW ENSIGN-CLARK Adjustable Speed STARTER

FOR BELT CONVEYORS

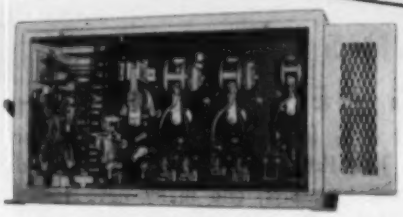


Photo illustrates 40/20 HP Bulletin 5390 Starter; Type ADJR — 3 point acceleration — Two Speed; Reversing 230 v. DC with Field Rheostat.

1. **Adjustable speed, 2 to 1 Ratio when used with adjustable speed motor.**
2. **Interlock on reversing switch provides half speed only on reverse.**
3. **Full Field on starting.**
4. **Field accelerating relay provides speed up from remote Push Button for shuttle car dumping.**
5. **Auxiliary contacts insure protection against damage to conveyor belt by slippage.**
6. **Three position selector switch provides independent or sequence operation.**

Sizes available:
30/15 HP 230 and 550 volt
40/20 HP 230 and 550 volt
Three points acceleration
60/30 HP 230 and 550 volt
75/37½ HP 230 and 550 volt
Four points acceleration

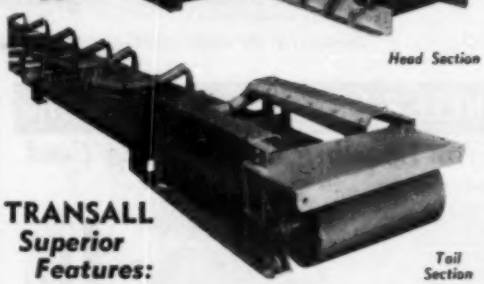
ENSIGN
ELECTRIC AND MANUFACTURING CO.
918 Adams Ave. Huntington 4, W. Va.

Coal Miner's Dream!

View in Coal Mine

We listened to coal miners—then designed the TRANSALL Conveyor to give them what they had long wanted: A single, rugged conveyor for every use in a mine.

Head Section



Tail Section

TRANSALL *Superior Features:*

1. **Pre-lubricated idlers**
2. **Low friction factor idlers**
3. **Dependable, trouble-free conveyor**
4. **Low operating cost**

One rugged conveyor for use throughout the mine: Main haulage; headings; and slopes. The TRANSALL simplified conveyor requires a minimum of expense to install and is easily and quickly moved.

TRANSALL INC.

107 North 11th St. Birmingham 4, Ala.

Manufacturers of a complete line of Belt Conveyor Equipment

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HUNDREDS of miscellaneous business problems that confront you from time to time, can be quickly and easily solved through the use of the Searchlight Section of this or other McGraw-Hill publications.

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The Searchlight Section is the classified advertising appearing in each of these papers. You can use it at small cost, to announce all kinds of business wants of interest to other men in the fields served by these publications. It is the regular meeting place of the man with a miscellaneous business need and the men who can fill that need.

When you want additional employees, want to buy or sell used or surplus equipment, want additional products to manufacture, seek additional capital, or have other miscellaneous business wants —advertise them in the Searchlight Section for quick, profitable results!

Classified Advertising Division

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Westinghouse
HYDRAULIC BRAKE EQUIPMENT

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WESTINGHOUSE
AIR BRAKE COMPANY
WILMERDING, PENNA.
INDUSTRIAL PRODUCTS DIVISION

SAVINGS FLOW FROM SPEED-LAY PIPE SYSTEM

EVERYTHING for a COMPLETE PORTABLE PIPE SYSTEM

FACTORY PACKAGED
PIPE—COUPLINGS
FITTINGS—VALVES
ACCESSORIES
LIGHTWEIGHT, SAVES LABOR
FAST, SIMPLE

ALBERT
PIPE SUPPLY CO., INC.
Berry at North 13th St.
Brooklyn 11, N. Y.
Phone EVergreen 7-8100

DELIVERED
READY FOR INSTALLATION

Immediate Installation by one unskilled man. 2½ to 12½ o. d. black or galvanized. Larger sizes can be furnished. Ready to lay—without delay.

SEND COUPON NOW!
ALBERT PIPE SUPPLY CO., INC.
Berry & N. 13th St. Brooklyn 11, N.Y.
Please send free booklet describing your Speed-Lay Pipe System and services:
NAME.....
FIRM NAME.....
ADDRESS.....
CITY.....STATE.....

How Can America Produce All the Steel It Needs ... for Military... and Civilian Purposes?

FREE BOOKLET Tells How to Conduct Scrap Salvage Program in *Your* Business.

Address Advertising Council, 25 W. 45th St., New York 19, N. Y.

One way is to feed more pig iron into the furnaces. But . . .

That will require *more* supplies of ore, limestone, coal, etc.*—to say nothing of more new ore boats and rail cars to transport the additional supplies.

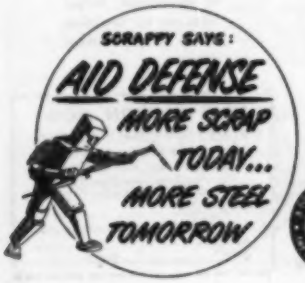
A better way—the *only* practical way—is to use the *dormant* iron and steel scrap lying around in the form of old machines, equipment, tools and metal structures.

Your business *must* have available scrap—in *some* form. That scrap is *needed* to keep the furnaces going in the steel mills . . . to keep our fighting forces and our allies well armed . . . to sustain our civilian life at home.

Think how many ways *you* use iron and steel. Think what would happen if it became extremely scarce. Put your iron and steel scrap to good use—now—by selling it to your local scrap dealer.

Don't delay—the emergency is becoming more severe every day.

*For every ton of scrap fed into the furnaces, we save approximately 2 tons of iron ore, 1 ton of coal, nearly ½ ton of limestone and many other critical materials. Also, scrap helps make steel faster, shortens the refining process.



NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

McGRAW-HILL PUBLISHING COMPANY, INC.

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"Delivers the heat" ALL OVER

E. K. Campbell Heavy Duty
FURNACE FAN SYSTEM

for TIPPLE GARAGE WASHERY WAREHOUSE REPAIR SHOP

Large spaces warm up in a hurry all over with an E. K. Campbell furnace fan system on the job. And costs go down!

Equipment and proper heating results are guaranteed—many highly successful coal field installations are in use today. First cost, operating and maintenance costs are surprisingly low.

Write today for full information.

E. K. CAMPBELL COMPANY
KANSAS CITY 3, MISSOURI

GOYNE
SOLIDS HANDLING PUMP

Feature:
LOW-COST OPERATION

GOYNE SOLIDS HANDLING PUMPS are extremely popular with a very large number of coal companies who find them quite reliable for pumping:

Liquids with solids added to increase specific gravities for coal and refuse separation in coal preparation plants.

Disposing of refuse and silt by pumping to waste material banks or for back filling into mined out areas.

Pumping prepared coal to temporarily desired storage areas.

These specially designed Goyne pumps incorporate numerous features to reduce upkeep and labor maintenance costs to a minimum:

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing *only the rear head of the pump.* No suction or discharge piping or any other major part of the pump is disturbed.

2. The only packing box of the pump is subjected to the low suction pressure rather than to the discharge pressure developed by the pump. This feature assures long packing and shaft sleeve life.

3. Impeller clearance is adjusted while the pump is running, insuring constant pump capacity so essential for uniform washing.

4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

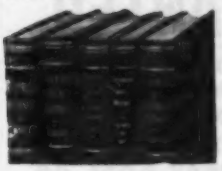
5. Spare parts are carried in stock at our plant for prompt shipment. Reduce your inventory by using Goyne Process Pumps.

All inquiries are given a thorough engineering analysis and our prompt attention.

GOYNE MINE PUMPS 1881

The GOYNE STEAM PUMP CO.
ASHLAND, PA.

It's YOUR Future—Make the most of it!



Start now to earn the bigger pay in electrical repair.

WAS there ever such an opportunity to get started in electrical maintenance and repair—and at top-notch wages? Are you ready—with experience and ability—to cash in on it? Others are getting just the sort of background needed—quick! practical!—to handle the great variety of electrical maintenance and repair work today—from this well-known electrical library. You can, too!

THE LIBRARY OF ELECTRICAL MAINTENANCE AND REPAIR

5 vols., 2,072 pages, 1,834 illustrations

Gives you the "know-how" to tackle any wiring or motor job. Five books show you HOW—to install all types of motor and generator units—to inspect and repair motor starters and generators—to diagnose motor and generator troubles—to test armature windings—test induction motors, etc., etc. One book is full of trouble-shooting charts that show quickly symptoms, causes, specific remedies, etc.

Take the first step toward improving your future—
Mail this coupon TODAY.

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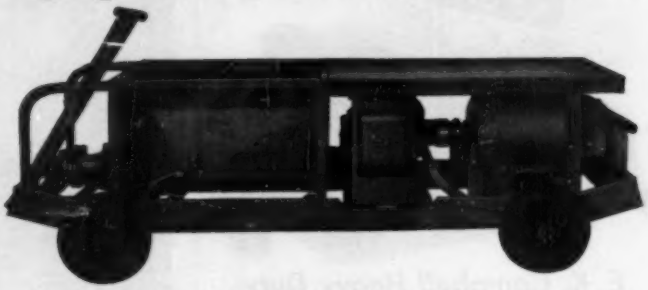
This offer applies to U. S. only.

Little Chief...

...high pressure Mobile Dustributor



New, mobile and portable. "Heap big power dusting job." Through 50 to 250 feet 1¼" hose . . . mounted on carriage, as illustrated, or with winch on skids . . . pulls itself on and off cars and conveyor belts . . . travels on skids 40 feet per minute, can be supplied without winch. May be had dust tight or Bureau of Mines approved, permissible with trolley tap or permissible plug for use of shuttle car.

Specifications: Length (with winch) 8'6"; length (less winch) 7'-0"; height (on skids 18"; width 20"; weight (with winch) 825 lbs., weight (less winch) 630 lbs.; hopper—capacity 2½ sacks; motor—3½ H.P., 1750 R.P.M. compound wound; voltages available—90, 230, 550 D.C., 220-440 A.C.; starter—across the line overload and fuse protection; air pressure 5 to 8 p.s.i.; hose—5 to 250 ft. of 1¼" ID dusting hose; dusting capacity—35 to 50 lbs. p.m. dry rockdust; bearings, motor, blower, winch, conveyor—anti friction. Safety overload releases; quick hose attachment.

Write for full specifications. Please use street and zone numbers. Mechanical Track Cleaners—Rock Dusters—Automatic Doors—Car Transfers—Cable Splicers & Vulcanizers—Safety Signal Systems.

American Mine Door Co.

2057 Dueber Ave. **Canton 6, Ohio**

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Address to office nearest you
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Position Vacant

WANTED—ENGINEER—Mining or Mechanical. Preferably under 35—for development of Mining Machinery. Give age, education, experience and physical defects on first inquiry. P-2508, Coal Age.

Position Wanted

POSITION WITH Large Coal Corp. as Supt. or General Manager, Stripping Method. Age 45. Healthy, married, go anywhere, several years experience. Best of references. Had my own business and sold out, familiar with large or small equipment, can work Union or Non-union labor, can talk to the lowest labor or your best buyer, can furnish good labor such as Operators & Mechanics. Would like long time operation. PW-2121, Coal Age.

PROCESS ENGINEER
GENERAL PLANT FOREMAN—SHIFT FOREMAN
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SAFETY ENGINEER—WAREHOUSEMAN

Wanted for permanent position with large new potash operation. Excellent opportunity. Location southwest.

P-2496 COAL AGE
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Engineers-Executives-Technical Men

Salaried Positions, $4,000 to $50,000. This Confidential service for men who desire a new connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details.

TOMSETT ASSOCIATES
339 Frick Bldg. Pittsburgh 19, Pa.

COAL MINE FOR SALE

fully equipped including river loading docks, now producing four hundred tons per shift, fourteen miles from large power plant located in Mason County, West Virginia.

ORCHARD COAL COMPANY
West Columbia, W. Va.

FOR SALE
OTTUMWA STEAM HOIST
AT LIQUIDATOR'S SALE PRICE

Heavy duty mine shaft hoist; double cylinder, 14" x 30", first motion, no gears. Double drums on one shaft, Diameter of drums 4' - 6", complete with throttle valve, indicator, lubricating pump, foot operated brake. Runs like new. Must be sold to close liquidator's sale. Price F O B Cars — $1800.00.

Two Jeffrey Shearing Machines, 36" gauge, Motors, open type, 220 V - 60 Cy. 3 Phase.

NEWCASTLE COLLIERIES LTD.
BOX 610
DRUMHELLER, ALBERTA, CANADA.

2—Goodman Style G20B77 permissible Shaker Conveyors, latest type, with manual type HAD duckbill and 20 HP Westinghouse AC motor, 3 phase, 60 cycle, 220 volt, 1160 RPM.

The above equipment is to include all usual accessories and is guaranteed to be in A-1 condition. New in 1943. It is offered subject to prior sale, f.o.b. Sunnyside, Utah.

KAISER STEEL CORPORATION
Sunnyside Mine
Sunnyside, Utah

FOR SALE

D-17000 CATERPILLAR Diesel Engine
Rebuilt & Guaranteed 95% New
Price $5,250.00

ANDERSON EQUIPMENT CO.
Box #1737 Pittsburgh 30, Pa.

WANTED

GOOD DROP BOTTOM
MINE CARS
4 OR 8 WHEEL —
44" TRACK GAUGE

AMHERST COAL CO.
LUNDALE, WEST VIRGINIA

WANTED

Coal washer, prefer Jeffrey unit type jig washer capacity, 60 to 100 tons per hour.

Allison Engineering Company
Route 8 and Burchfield Road
Allison Park, Pennsylvania

BARGAIN

2 Model 776-2 2 yd.
BLAW-KNOX BUCKETS

Capacity 3000 lbs. of coal at less than half price.
Excellent Condition.

HUNTER TRACTOR & MACHINERY COMPANY
327 S. 16th St., Milwaukee 3, Wis.
Phone: Gr. 2-6580

Plymouth 35-ton gasoline locomotive, std. ga.
P&H 1055 dragline, 55ft crane; diesel.
B-Erie 520 2½-yd. diesel shovel-dragline.
Walking dragline, 3, 3, 6 and 12-yd.
Locomotive cranes, diesel, 30 & 40 tons.
Euclid rear dump trucks, 15 to 32 tons.
Whirley portal gantry cranes, also, (4).
Rotary dryers, 4x40, 7x80, 9x10x170.
Shovels, Draglines, Cranes, 1½ to 10-yd.
H. Y. SMITH CO., 833 N. 8'way, Milwaukee 2, Wis.

FOR SALE

MOTOR GENERATOR SETS

1—250KW Westinghouse synchronous rotary converter, 1200 RPM, 275/300 volts DC, automatic switchboard.
2—200KW G. E. Motor Generator Sets, 1200 RPM, 2300 volts AC, 250/275 volts DC, automatic switchboard.
1—200KW Ridgeway Motor Generator Set, 2300 volts AC, 250/275 volts DC, manual switchboard.
2—150KW G. E. Motor Generator Sets, 1200 RPM, 2300 volts AC, 250/275 volts DC, automatic switchboard.
1—100KW General Electric synchronous Motor Generator Set, AC end 135 HP, 2300 volts, type 7S, 1200 RPM. Direct connected to type CD, 100KW, 1200 RPM, 250 volts DC generator, complete with switchboard.
1—75KW Westinghouse Motor Generator Set, 250 volts DC, 220 volts AC, complete with switchboard.

MINING MACHINES

7—512 E/H Goodman DC shortwall mining machines, complete with bug dusters, hydraulic control, 8½' cutter bars, cables, and Joy T1 cat trucks. Serial Nos. 6909, 6910, 6911, 8664, 8665, 8934, 8935 (Like new)
2—512-DG3A Goodman shortwall mining machines, AC, 8½' cutter bars, complete with cable. Without trucks.
2—512-EL3 Goodman shortwall mining machines, AC, 7' cutter bars, complete with Joy T1-4G cat trucks and cables.
5—112AA Goodman Universal shortwall mining machines, AC, without trucks.
1—12AA Goodman standard shortwall mining machines, DC, with trucks.
3—Sullivan CLE5 longwall mining machines, 3/60/230 volts, with 4½' cutter bars.
1—112AA Goodman Universal DC shortwall mining machine. (With trucks.)
2—12AA Goodman AC, 60 HP, standard shortwall mining machines. (With or Without trucks)

CRUSHERS

1—36 x 36 Jeffrey single roll crusher.
1—24 x 60 Link Belt double roll crusher.
1—24 x 48 McNally Pittsburgh double roll crusher.
1—20 x 36 United Iron Works single roll crusher.
1—24 x 24 Hercules single roll crusher.
1—24 x 24 Webster single roll crusher.
1—24 x 24 Stephens Adamson single roll crusher.
1—12 x 16 Eagle Iron Works double roll chipper, complete with hopper and 7-½ HP AC motor. (Mounted on one base. Like new.)
1—48" McNally Pittsburgh Vertical Pick Breaker.
2—American Pulverizer Co. Ring Roll crushers.

COPPER

Several thousand feet 4/0 and 6/0 figure 8 trolley wire.
Several thousand feet of #6, 2/C, 5,000 volts, lead covered armored cable.
Several thousand feet of 750,000 and 1,000,000 CM, bare and weatherproof, stranded copper wire, in long lengths.
Several thousand feet 1/0 hard drawn bare copper.
Several thousand feet #4 hard drawn bare copper.

LOCOMOTIVES (Ball Bearing)

Make	Type	Gauge
1—20 ton Goodman	26-AO4T	42"
1—15 ton Jeffrey	ME110	42"
1—10 ton Jeffrey	MH11O	42"
1—10 ton Goodman	29A-O-4-C	42"
3—6 ton Goodman	32AO4T	36"
1—8 ton Goodman	32AO4T	42"
5—6 ton G. E.	HMH21A	42"
1—6 ton G. E.	HM702B	42"
1—6 ton Jeffrey	MH64	42"
1—4 ton Goodman	42-I-4-T	36"

DRILLS

Several Chicago Pneumatic, 472 and 473, AC and DC drills.

HOPPER CARS

22—15 ton Sanford Day automatic drop bottom cars with multiple latch arch bar truck, 4 wheels under each end, 19" wheels, 36" gauge, Sanford Day roller bearing trucks. Overall dimensions: Overall length over bumpers 33'2"; Overall length inside 30'11⅛"; Overall width 6'10⅝"; Overall height 6'6". Size of door: Width 3'9". Length both doors 11'9¼".

CONVEYORS

1—Jeffrey Apron Conveyor, 48" wide and approximately 57' long.
1—Webster Apron type Feeder, 54" wide and 11' long.
2—Goodman 97-C-30 Head and tail pulleys complete with Link Belt speed reducers and AC motors.

RAILS

Approximately 100 tons used 16# rails, random lengths.
Several hundred tons of rails, 56# and up, suitable for roof bars, random lengths from 8½' and up.
We carry splices, angle bars, track bolts, and track spikes in stock.

VIBRATORS

1—48" x 102", style C-700, Robbins Gyrex double deck.
1—Stephens Adamson two deck vibrator, size 4' x 10'.

SCALES

1—Fairbanks Morse truck scale 30' platform.

CAR PULLERS

1—Sullivan CHD, DC car puller and RP rope puller (like new).
1—Brown Fayro, AC, Type HKL car puller.

GAVENDA BROTHERS, Inc.
CANTON, ILLINOIS

MINE AND SLOPE HOISTS

1—30,000# Allis-Chalmers Dbl Drum
1—30,000# Nordberg Sgl Drum
1—30,000# Vulcan Sgl Drum AC with MG Set Complete
1—11,000# Wellman, Sgl Drum AC
1—16,000# Allis-Chalmers Sgl Drum
1—7,000# Ottumwa Sgl Drum AC

CARPULLERS AND LOADERS

1—8000# Jeffrey Carspotter AC
1—8000# Brownie Carspotter AC
1—8000# Link-Belt Carspotter AC
1—20,000# Amor, Hoist Carspotter AC
1—20,000# LB Endless Puller

CRUSHERS & MISC.

1—30x36 Jeffrey Sgl Roll
1—12x16 Eagle Dbl Roll
1—18x20 Eagle Dble Roll
1—200 ft. 20" SA Comb. Scraper & Bucket Conveyor w/o Mtr., Ideal for tipple or dock.
2—24"x60" SA parts, conveyors, AC mtr
1—(New) NOLAN parts, feeder
1—22"x66" SD-RS Roots Connersville Positive Pres. Blower output 45 CF per. Rev. Complete with 100 hp. AC Mtr and controls.
1—1 yd. Saurman Scraper Bucket System
1—75' x 28' x 30' high Steel Building

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MOTOR GENERATORS

1—500 KW G. E. Syn. 275 V. 1200 RPM
1—300 KW WEST. Syn. 275 V. 1200 RPM
1—200 KW RIDGWAY Syn. 275 V. 900 RPM
2—150 KW G. E. Syn. 275 V. 1200 RPM
1—150 KW WEST. Syn. 275 V. 1200 RPM
1—100 KW RIDGWAY Syn. 275 V. 1200 RPM
2— 30 KW G. E. Ind. 275 V. 1200 RPM

ROTARY CONVERTERS

1—500 KW G. E. Syn. 275 V. 1200 RPM HCC, 6 Ph., 60 Cy. Transformers
1—300 KW WEST. Syn. 275 V. 1200 RPM 6 Ph., 60 Cy. Transformers
2—200 KW Al-Ch Syn. 275 V. 1200 RPM 6 Ph., 60 Cy. Transformers
1—150 KW G. E. Syn. 275 V. 1200 RPM HCC, 6 Ph., 60 Cy. Transformers
1—150 KW WEST. Syn. 275 V. 1200 RPM 6 Ph., 60 Cy. Transformers
2—100 KW G. E. Syn. 275 V. 1200 RPM 6 Ph., 60 Cy. Transformers

ARMATURES

1—500 KW G. E. 275 V. MPC Gen. 900 RPM
1—300 KW G. E. 275 V. HCC Gen. 1200 RPM

LOCOMOTIVES

2—20 T JEFFREY 250 V. 3-MH-77 42-36" Ga.
1—25 T G. E. 500/250 V. 3-MM-526-A 44-36" Ga.
1—20 T WEST. 250 V. 3-ML-929-C 36" Ga.
1—20 T JEFFREY 250 V. MH-77 42-36" Ga.
1—20 T G. E. 250 V. (Tandem) HM 600 36" Ga.
1—13 T JEFFREY 250 V. MH-2164 36" Ga.
1—12 T JEFFREY 250 V. MH-2110 42-36" Ga.
1—13 T JEFFREY 500 V. MH-110 44-36" Ga.
1—10 T JEFFREY 250 V. MH-2110 44-36" Ga.
2—10 T JEFFREY 250 V. MH-110 42-36" Ga.
1—10 T WEST. 250 V. ML-907-C 36" Ga.
2—10 T GOODMAN 250 V. 36-B 36" Ga.
6—8 T JEFFREY 250 V. MH-110 42-36" Ga.
2—8 T WEST. 250 V. ML-906-C 42-36" Ga.
10—6 T JEFFREY 250 V. MH-88 44-36" Ga.
1—6 T G. E. 250 V. HM-623 42-36" Ga.
2—4 T WEST. 250 V. ML-901-C 36" Ga.
1—4 T GOODMAN 250 V. MG-4-E 36-24" Ga.

LOCOMOTIVE MOTORS

2—JEFFREY 250 V. MH-77, Ball Bearing
2—WEST. 250 V. ML-906-C, Ball Bearing
2—WEST. 250 V. ML-904-R, Ball Bearing
2—WEST. 250 V. ML-901-C, Ball Bearing
2—G.E. 500/250 V. MM-526-A, Ball Bearing
2—G.E. 85/125 V. MM-528-A, Ball Bearing
4—WEST. 80 V. V-49-X, Ball Bearing
Extra Armatures Available for above motors.

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3—20-ton Jeffrey MH-77
2—13-ton Jeffrey MH-110
1—13-ton Jeffrey MH-110
1—10-ton Jeffrey MH-110
2—10-ton Goodman 34-B
12—6-ton Jeffrey MH-100 with reels
2—6-ton G.E. MM-819 with reels
2—6-ton Westinghouse 005-C with reels
4—6-ton G.E. MM-834 with reels
12—6-ton Jeffrey MH-60 with reels
4—6-ton G.E. MM-801 with reels

Complete with new Jeffrey steel strip resistances.
All have been rebuilt and any part showing any wear was replaced with new.

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6—Joy 14-BU3PE Loadmaster low pedestal type
6—Joy 8-BU; 3—Joy 11-BU; 3—Goodman 650; 3—Goodman 300; 4—Goodman 300;
1—Jeffrey L-800; 2—Jeffrey L-500;
2—Myers-Whaley No. 3 Automatic, practically new

SHUTTLE CARS, CABLE REEL TYPE, 250 VOLT DC

4—Joy 42E-16AX
3—Joy 42E-13X
5—Lee-Norse Koal-Mobile, Type KMC42B, 4-wheel drive, 32" high
12—Lee-Norse Koal-Mobile, Type KMC40B-1
10—Joy Type 42D3 with practically new batteries

MOTOR GENERATOR SETS—2300/4000 VOLT

1—300 KW Westinghouse, 275 V 1200 RPM, full automatic switchgear
4—300 KW G. E., 275 V 1200 RPM, full automatic switchgear
2—150 KW G. E., 275 V 1200 RPM, manual switchgear

ROTARY CONVERTERS—TYPE HCC-6, 2300/4000

1—300 KW G. E., 275 V 1200 RPM
4—300 KW G. E., 275 V 1200 RPM
1—150 KW G. E., 275 V 1200 RPM
All complete with switchboards, transformers and all necessary appurtenances.

Sheldon J. Wolfe Frank J. Wolfe

DC CUTTING MACHINES — 250 VOLT

4—Jeffrey 29-U; 3—Jeffrey 29-LE; 10—Jeffrey 35-BB
8—Sullivan 7-B on Joy cats; 6—Goodman 512 on Joy cats
12—Goodman 12-AA; 15—Goodman 112-AA

AC CUTTING MACHINES—230/460 VOLT

3—Jeffrey 29-U; 3—Jeffrey 35-BB; 1—Jeffrey 35-L
1—Jeffrey 24-B; 1—Goodman Universal; 5—Goodman 126J
5—Goodman 112GJ; 4—Goodman 112GJA; 5—Goodman 112GDJA

STEEL TIPPLES AND WASHERS

Several 4-, 5-, and 6-track lots type steel Tipples; also Link-Belt, McNally-Norton, and Heavy Media Coal Washers with capacities of 200 and 300 tons per hour; and two McNally-Norton Unit Washers of 100 tons per hour capacity.

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400 KW West. 550 v. 720R-Syn.-SK 2300/4000
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300 KW G.E. 275 v. 1200R-MPC-ATI 2300/4000
300 KW Rdg. 275 v. 1200R-Syn. 2300
300 KW West. 550 v. 1200R-Syn.-SK 2300
200 KW West. 275 v. 1200R-SK-CW 2300
200 KW Rdg. 275 v. 900R-Syn. 2300
150 KW West. 275 v. 1200R-Syn.-SK 2300
150 KW G.E. 550 v. 900R-DLC-ATI 2300
100 KW Rdg. 275 v. 1200R-Syn. 2300
50 KW G.E., 275 v. 1200R-KT-RC 2300

ROTARY CONVERTERS

500 KW West. 275 v. 1200R, 2200/4000
2—300 KW ALCh. 275 v. 1200R, 2200/4000
300 KW G.E. 275 V. HC12-600 R, 2200/4000
150 KW West. 275 V. 1200 R, 2200/4000

PORTABLE AIR COMPRESSORS

2—142 CFM 100# pres. Ingersoll Rand Model 25-B. Late Type. 30 HP 230 V. DC

AC MOTORS

HP	MAKE	SPEED	TYPE	WDG.
400	G.E.	450	MT	S.R.
300	G.E.	450	IM	S.R.
160	G.E.	600	IK	S.C.
150	G.E.	600	ATI	Syn.
2—100	G.E.	450	IM	S.R.
100	Al.-Ch.	720	ARX	S.C.
100	West.	900		Syn.
100	West.	1200	CS	S.C.
75	G.E.	600	ITC	S.R.
75	West.	900	CS	S.C.
40	G.E.	900	MT	S.R.

LOCOMOTIVES AND CUTTING MACHINES

10 Ton Jeff 250 v. 36/48" MH110
8 Ton Goodman 250/550 v. 42"/44" ga.
6 Ton Westgh. 250 v. 36" Ga. 904
6 Ton G.E. Battery 42/44" Ga.
5 Ton Greensburg Bat. Loco.—Philco Bat.
4—5 Ton Goodman 500 250 v. 42/44"
35 B Jeff. 250 v. Permissible
12 G3 Goodman Shortwall 220/3/60
3588 Jeff. A.C. permissible

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1—Vulcan Shaft Hoist, complete with 350 H.P., Motor, control equipment.
1—300 K.W. Ridgway M.G. Set, 550 V. D.C., 4160/2200 V. A.C., complete with switchboard equipment.
11—Goodman G15 Shaker Conveyor Drives, with 15 H.P., 250 V. D.C. Motor, starter and jacks included.
6—Goodman "Yo-Yo" (used on discharge end of 97HC30 belt conveyors).
2—Goodman 120A Shortwall Mining Machines with trucks, 250 V. D.C.
1—Goodman 120A Armature, 250 V. D.C.
2—Goodman 424BJ Permissible track-mounted Mining Machines complete, 42" gauge, 250 Volt D.C., 9 ft. Cutter Bar. Dimensions: 20" ht., 8 ft. width, length, 26 ft. Also spare complete cutting motor, assemblies and parts.
350 Ft.—Size 1/0, 3 cond., 10 strand 0 x 3/64" Varnished Cambric, 6/64" lead cover—2000 Volt Cable (Anaconda) new and never used (1 full length all on a reel).
2—Jeffrey 35B Armatures, 250 V. D.C.
2—Jeffrey 35B Cutter Bars, 7 ft. (Good as new)
1—Nilos Equipment Co. Type 24 Oil Heater with Oil Burner and Blower, complete (new and never used)
50—Watt 4-wheel wood Mine Cars, end dump, 42" ga. (In good condition).

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Greensburg, Pa.

FOR SALE

WIRE ROPE

2—1,250 Ft. Pcs. 1-⅜" Bowbling Locked Smooth Coil Track Strand Wire Rope for Aerial Tramway. NEW—NEVER USED. Apply to THE SNAP CREEK COAL COMPANY, P.O. Box No. 1029, or Tel. 1533, Logan, West Virginia.

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TOUGH COVERS—Heavy duty, specially compounded abrasive resistant rubber covers having high tensile strength. Thoroughly capable of withstanding the abrasive action of bulk materials. Properly vulcanized to the carcass to assure utmost performance, economically.
STRONG CARCASS—Constructed of finest quality 28 and 32 ounce tough cotton duck, properly treated and impregnated to avoid mildew from moisture and atmospheric conditions. Each ply thoroughly embedded in rubber to prevent ply separation.
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Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
8"	4	1/16"	1/32"	28 Oz.
10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	5	1/8"	1/16"	32 Oz.
48"	6	1/8"	1/16"	32 Oz.

INQUIRE FOR SIZES NOT LISTED. ELEVATOR TRANSMISSION & V-BELTING ALSO IN STOCK.

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Steam—Diesel—Gas
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New—Used
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1 Complete heating, forging, hot milling and bit and tool sharpening shop.

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116 PUMPS FOR ALL PURPOSES.

Sludge, deep well, circulating, gathering, grouting, air and suction 100 G.P.M. 1000 ft. hd., 1800 ft. head 500 G.P.M., 500 G.P.M. 1000 ft. head.

All pumps in excellent condition.
14 Low and High Pressure Blowers.

COMPRESSOR

3 Stationary Comp. C.P. Type YCM, 2 stage G.E. Syn. 100 hp, 440v., 60 cy., 3 ph. motor, dir. con. 595 cfm, with exciter, and starting panel.
3 Stationary Comp. C.P. Type YCM, 2 stage G.E. Syn. 125 hp, 440v., 60 cy., 3 ph., motor, direct con. 686 cfm with exciter and starting panel.
4 Stationary Comp. C.P. Type YCM, 2 stage G.E. Syn. 150 hp, 440v., 60 cy., 3 ph., motor dir. con. 774 cfm with exciter and starting panel.

HOISTS

1 Hoist, Minc—Lidgerwood with Caterpillar Diesel D13000 Power Unit—6 cylinder—5¾" Bore—128 H.P. Drum 54" x 30"—6¼" shaft 2¾" flange. Estimated capacity—550 FPM on first layer of ⅝" rope, line pull—5,000 to 6,000 lbs. with J. S. Mundy Co. quadrant control. Serial No.—Hoist-None, Power Unit-452720.
1 Hoist, Ottumwa, Serial No. 4063, 48" dia. x 48' 5½" shaft, Rope speed 470.5 RPM—grooved for 1" wire rope, Westinghouse Reversing Drum Controller—Type R28V, Serial 405377 G.E. CR-9516 Thrustor Brake, with Westinghouse Induction Constant Speed, Type CW, Style LA-4029, 440 volts, 200 H.P., 1750 RPM, 3 ph. 60 cycle, 209 amps. per ring 431 amps. between rings—Serial No. 871-C.
1 Hoist, Ottumwa, Serial No. 4058, 48" dia. x 69" grooved for 1" rope—7½" dia. shaft.—Rope speed 226 FPM—Cage speed 113 FPM with General Electric Induction Motor, Model No. 19E120, 150 H.P., 440 Volts, 3 phase, 60 cy. 195 amps., Type MT-C5562—12-150-600, form BL—full load speed 575 RPM—secondary amperage—194—Secondary volts—371, Serial No. 5167102. Westinghouse Reversing Drum Controller, Type R28V, Serial 405402.

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MINING LOCOMOTIVES

16 Locomotive storage battery Greensburg Machine Co. "Cruiser" type, 24" gauge, 2 motor drive—Battery box included. Motor controlled Type SPAF 346.
32 Exide Iron Clad storage batteries 48 cell 19 plate 41.712 KW.
13 Battery charging units 10KW—20KW—25KW—30KW.

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6 Muckers, Eimco Rocker Shovel, Model 40 equipped with Ingersoll-Rand EE 5 UP & KK5D Air Motors for 36" ga. track and pony att. for tramming on 24" track: equip. with horz. & vert. swing adjust on conveyor. Serial Nos.: 40057, 40058, 40063, 40066 and 40067.
2 Muckers, Eimco Rocker Shovel, Model 21 for 24 gauge track, equip. with Ingersoll-Rand Air Motors, Model HH5D, Serial Nos. 3484 & 3904

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Demolition Tools, Clay Diggers, Close Quarter Drills, Heavy Duty Drills, Sinker Drills, Riveters, Air Motors, Air Saws, Power Vane Drills, Weld Flux Chipper, Multivane Drills and Hammers.

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Price $49,000

Lima Type 1201 Loading Shovel, 39 ft. boom, 24 ft. dipper stick, 3¾ cu. yd. dipper. Powered by Cummins Diesel. Location Mountain Iron, Minnesota.
Price $37,500

111 M Marion Standard Shovel Attachment, 28 ft. boom, 23'9" Stick, 3½ yd. Manganese Bucket. This item is brand new. Located in Johnstown, Pa. Immediate delivery at considerable less than replacement cost.
1—Bucyrus-Erie 54B Hi-Lift Shovel Front with 45' Boom, 32' Tubular Steel Handle and two c.y. Dipper. Location Johnstown, Pa.
High Shovel Front for Lima 1201 with 42 ft. boom, 32 ft. dipper stick and 5 cu. yd bucket. Complete with riggings etc. New in 1947. Available immediately.
We also have several Hi-front Shovel attachments for Lima Model 1201 machines.
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4—10 ton Atlas Battery Locomotives, 36" gauge.
1—6 ton Goodman Trolley Locomotive, 36" gauge.
2—8 Ton Goodman Battery Locomotives, 36" gauge
2—8 Ton Mancha Battery Locomotives, 36" gauge
2—8 Ton Goodman Trolley Locomotives, 36" gauge
1—5 Ton Jeffrey Trolley Locomotive, 36" gauge
2—80 Joy Loaders
2—61 EW Jeffrey Elevating Conveyors
1—61 HG Jeffrey Chain Conveyor, 90'
2—61 W Jeffrey Chain Conveyors, 200'
1—Northern Portable Coal Unloader Conveyor, 14" x 14'6"
1—Farquahar Portable Coal Unloader Conveyor, 18" x 18'
2—Chicago Portable Load Loaders, 14" x 36'
1—7000# H. & B. Single Drum Electric Hoist.
1—7000# Vulcan Single Drum Electric (or steam) Hoist.
1—150 HP Vulcan Single Drum Electric Hoist.
30—Type HS New American Blowers, 12000 CFM, direct driven by variable speed Wagner motors with controllers, for either 440 V., 230 or 125 Volt DC.
1—28-H Jeffrey "Aerodyne" 42" Fan.
1—74 KW D-13000 Caterpillar Diesel Electric Generating Unit.
1—40 KW Imperial Motor-Generator Set, 230 Volt.
1—165 KW General Electric Motor-Generator Set, 600 Volt.
1—18" x 18" McNally-Pittsburg Double Roll Coal Crusher.
Relaying rail and track accessories.
12—Chicago-Pneumatic Permissible Coal Drills, 440 V
8—Goodman G 20 Shaker Conveyors
1—G 15 Goodman Shaker Conveyor
4—Vulcan Shaker Conveyors
3—Brown-Fayro Permissible Blower Fans
10—Goodman HA Duckbills
13—CE 7 Sullivan Mining Machines
2—7B Sullivan Mining Machines
2—CR3 Sullivan Mining Machines
125—Card Steel Mine Cars, 36" gauge
1—150 Tons Per Hour Complete Tipple with screens, picking booms, box car loaders, oil and chemical treating equipment and magnetic tramp iron separator.
1—375 HP Box single drum hoist complete with motor and panel.

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A BARGAIN
ELECTRIC SHOVEL

80 B Bucyrus electric 440 Volt shovel, 2½ yard capacity. 48' boom, 32' dipper sticks. Ohio location.

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Any length. Flights up to 8" x 24". All welded structural and sheet steel. Heavy duty, double guided chain.
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Eccentric weight types. Several in stock from 2' x 4' to 3½' x 8'.
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1—24" x 24" Jeffrey Single Roll
1—18" x 18" Jeffrey Single Roll

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2—29U Jeffrey, 250 Volt DC
2—7AU Sullivan, 250 Volt DC
4—35B or 35BB Short Walls.

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Pittsburgh 6, Penna.

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TRACK ACCESSORIES

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NEW
RELAYING
SWITCH MATERIAL
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FOR SALE

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3—333 KVA G-E 44000—6600
3—250 KVA W-H 13800—2300
3—200 KVA G-E 13200—120/240
3—250 KVA Kuhl 6600—575
3—150 KVA G-E 44000/33000—2400/500
3—150 KVA Pitts 22000—575
3—150 KVA G-E 19050/13000Y—2540/2350
3—150 KVA A-Ch 13800—2300
3—100 KVA G-E 33000—6900/11950Y
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15 ton Sanford Day 36" ga. bottom dump cars

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1—36" American Ring Type Crusher

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2—7½ Ton Goodman Trolley Locos. 36" ga.
1—4½ Ton Goodman Loco., 36" ga.

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1—#6½ Vulcan, single drum
1—Box Iron Wks. Single Drum, direct geared to a 15 HP Slip-ring Motor
1—H&B Single Drum Converted, direct geared to a 25 HP Slip-ring Motor
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1—750' Jig-back Tram
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1—Stromberg Metal Mine Phone — Wall Telephones.
1—Manierre Type Box Car Loader, 12' center, 18" belt.
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2—500 gal. Fuel Oil Tanks
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2—Joy Low Pedestal 14 BU Loaders.
2—Joy Med. Pedestal 14 BU Loaders.
2—Joy T-2, 5 PE Cat. Low-Pan Machine Trucks.
2—Joy T-3 Caterpillar Trucks.
2—Joy Belt Feeders.
4—Joy 20'' Chain Conveyor, 200' Centers.
4—Joy & Brown Fayro Car Spotting Hoists.
6—Joy Ladel Shaker Conveyors, 300'.
1—Each—Joy 26" and 30" Underground Belt Conveyors, 750'.
3—Joy Elevating Conveyors—Late Type.
50—Mine Cars, End Dump, 42" and 44" Ga.
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3—Jeffrey 63 EW Elevating Conveyor.
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4—Jeffrey MH-88 Locomotives, 6 T.
1—Jeffrey MH-110 Locomotive, 13 T.
2 Dump Trailers, 15 T Capacity.
1—GE 80L Loco., 42" Ga. with reel. 6 T, Armor Plate frames.
1—GE 822 Loco., 44" Ga., 8 T., 2" Armor Plate Frame, 250 V.
2—Goodman 512 Machines with Bag Dusters.
2—Goodman Std. 12AA Shortwall Machines.
3—Jeffrey 35-B Mining Machines, 250 V.
6—Chicago Pneumatic 572 Coal Drills.
1—Roll, 204' New 26" Belting.
1—GMC Diesel Unit Complete with 250 volt generator, 85 KW.

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Immediate Stock Shipment

1—150 kw, 275 volts DC, rotary converter, 1200 rpm., compound wd., 6 ph., 60 cy.
3—300 kw, 275 volts DC, rotary converter, 1200 rpm., compound wd., 6 ph., 60 cy.
(All of above are with trans. & switchgear)

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HOIST: Lidgerwood, single drum, electric.

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1—100 kw., same as above with 220/440 V. New A.C. Generators.
4—30 kva., 120 v., 1 ph. 60 cy. Westinghouse dir. con. to 50 HP., 4 cyl. 500 rpm., LaMal Gasoline Engines with control panels.
6—25 kw., 220/440 v. 3 ph. 60 cy. Westinghouse direct connected to 4 cyl. LaMal Gasoline valve in head liquid cooled Engine complete with panels.
10—37½ kva. 3 ph. 60 cy. 127/220 or 220/440 v. 1200 rpm. Century dir. con. 70 HP., International Harvester U.D. 14 DIESEL.
1—37½ kva., 127/220 v. or 220/440 v. 1800 rpm., dir. con. Buda water cooled DIESEL.

SLIP RING MOTORS
3 Phase—60 Cycle

HP	Make	RPM	Volts
450	Allis Chal.	295	2300
400	West.	436	2300
300	Cr. Wh.	290	2300
300	West.	580	220/440
250	West.	580	2300
150	G. E.	690	2300
150	West.	870	2300
150	West.	870	220/440
100	Triumph	880	550/440/220
75	G. E.	690	550/440/220
75/100	West.	580/680	2300
75	G. E.	720	220/440
60	G. E.	870	220/440
60	Burke	1200	220/440
60	G. E.	870	220/440
50	Allis Chal.	880	220/440
50	G. E.	880	220/440
50	G. E.	1200	220/440
40	G. E.	1260	550/440
30	G. E.	885	2300
30	West.	880	220/440
30	Allis Chal.	1171	220/440
25	West.	870	220/440
25	G. E.	870	220/440
15	Allis Chal.	1171	2300
15	G. E.	870	220/440
15	Howell	1800	220/440
10	West.	1800	220/440
10	G. E.	880	220/440
10	G. E.	1150	220/440
10	West.	1760	220/440
5	West.	1800	220/440

230 VOLT DC MOTORS

HP	MAKE	TYPE	RPM
600	Cr. Wh.	CCM	350/350
400	Cr. Wh.	CCD	350
400	West.	——	350
150	Cr. Wh.	CMC	1200
120	G. E.	DMC	600/750
100	West.	SK-100	1800
100	West.	SK-142L	1700
80	West.	SK-143	900
60	West.	SK-123L	1700
60	Cr. Wh.	CMC	1200
60	West.	SK-100	1200
40	All. Chal.	EL-48	875
40	West.	SK-140	1775
40	Cont.	Sp. Pr.	1750
30	West.	SK-80	1800
25	West.	SK-100L	1800
25	G. E.	CD66	1750
20	L. Allis	FNA	1750

MOTOR GENERATOR SETS

100 KW, Crocker Wheeler, 250 V. DC, 1750 RPM, 2200 or 550/440 Volt Syn.
150 KW, Crocker Wheeler, 250 V. DC, 1750 RPM, 2300 or 220/440 Volt Ind.
100 KW, Hobart, 250 Volt, 2200 Volt, 3 Phase, 60 Cycle, 1750 RPM Ind.
60 KW, West., 250 Volt DC, 1150 RPM, 220/440 Volts AC.

NEW ENGINES

75 HP, P&H full Diesel, Model 287C, 1400 RPM, heavy duty, 3 Cylinder.
150 HP, P&H, 6 Cylinder, full Diesel, Model 587C, 1400 RPM, heavy duty.

NEW AIR COMPRESSORS

6 cfm Gardner Denver 100-175 lb.
7.2 cfm Gardner Denver 100-175 lb.
9.7 cfm Gardner Denver 100-175 lb.
22.2 cfm Gardner Denver 100-175 lb.
26 cfm Gardner Denver 0-175 lb.
32.9 cfm Gardner Denver 80-100 lb.

NEW PUMPS

GPM	HEAD	MAKE	
40	817'	Northern	
80	60'	Gardner	Denver
90	37'	Gardner	Denver
110	132'	Gardner	Denver
120	40'	Gardner	Denver
180	110'	Gardner	Denver
200	100'	Gardner	Denver
240	80'	Gardner	Denver
240	160'	Gardner	Denver
320	142'	Gardner	Denver
400	120'	Gardner	Denver
600	150'	Gardner	Denver
1000	120'	Gardner	Denver

250 VOLT DC GENERATORS

KW	MAKE	TYPE	RPM
600	Cr. Wh.	CCM	375
375	West.	——	600
150	Burke	B-70	900
150	Cr. Wh.	CMC	1440
100	West.	SK-100	720
100	Al. Chal.	——	275
100	Deloo	120/240	1200
75	West.	SA	750
60	West.	——	875
60	West.	SK	1150
80	West.	SK-100	1150

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DUQUESNE ELECTRIC & MFG. CO.

PITTSBURGH 6, PA.

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* Indicates that detailed information may be found in the 1950-51 MINING CATALOGS.

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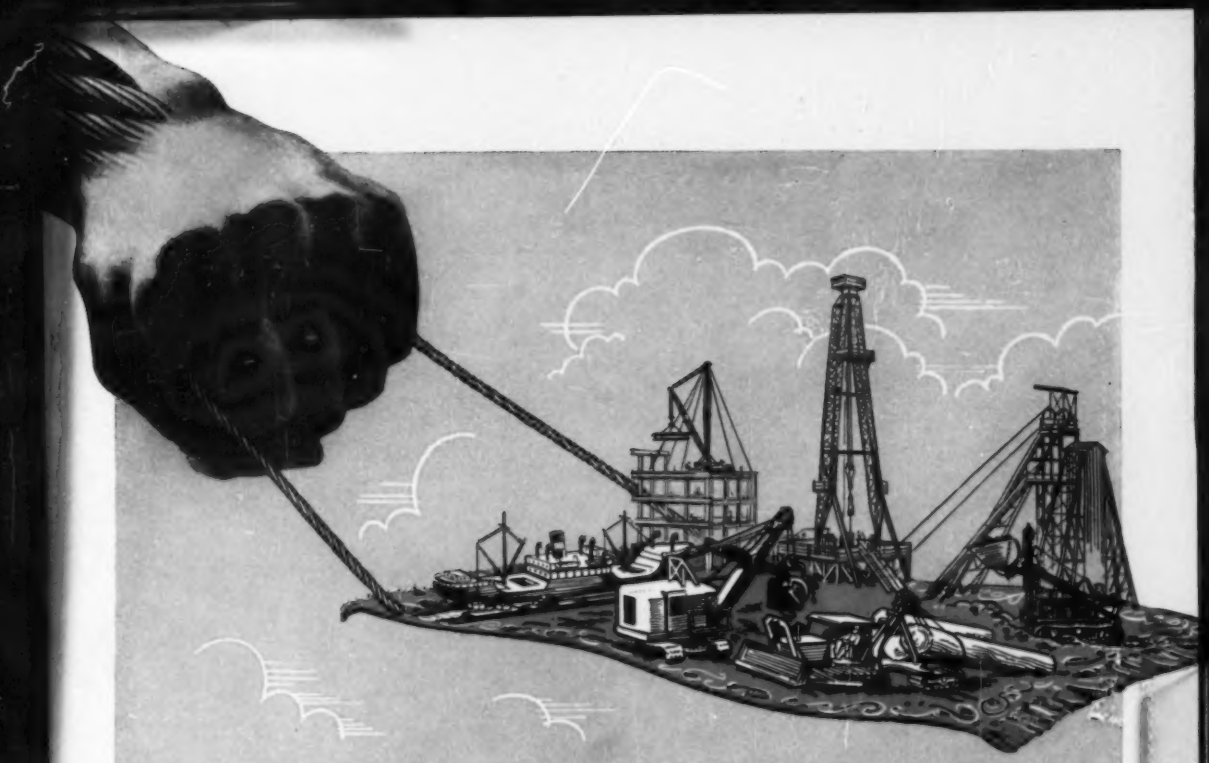

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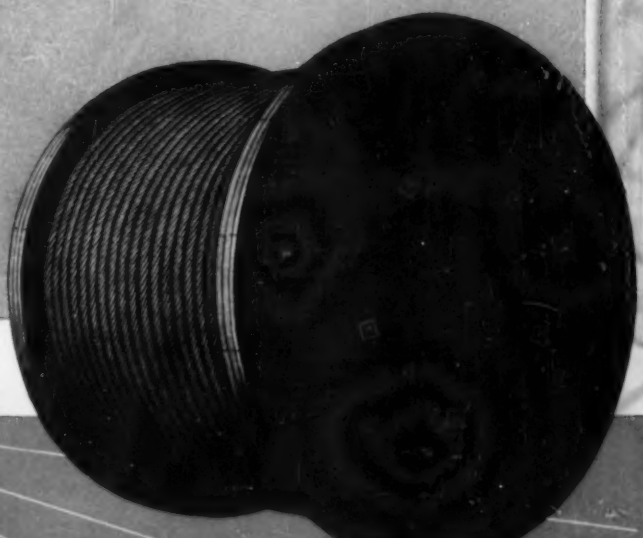

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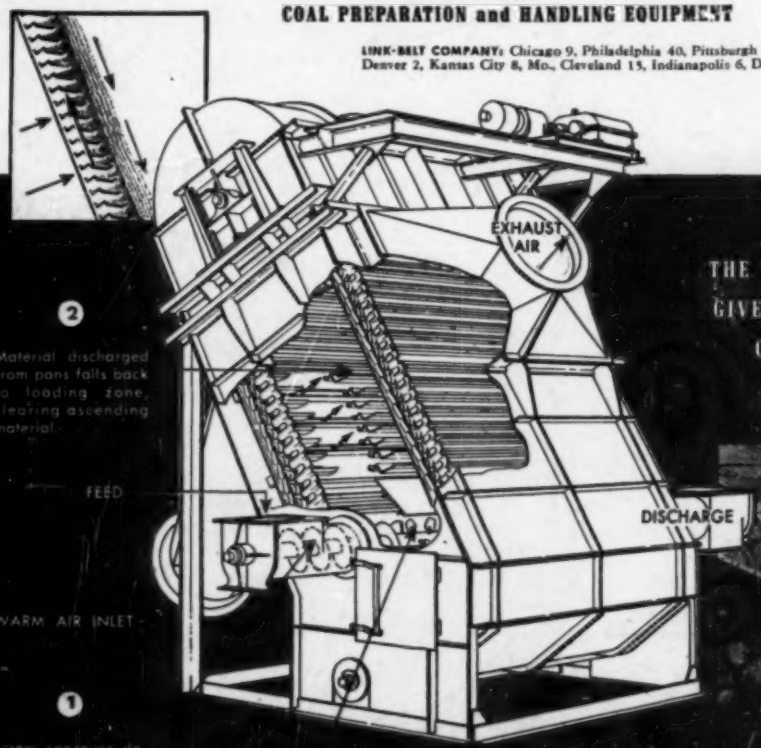

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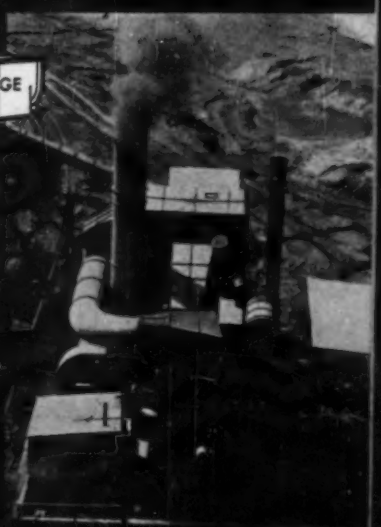
(2) Material discharged from pans falls back to loading zone, clearing ascending material.

(1) Screw conveyor delivers coal to pans at near side.

(3) When material, after several passes through the air stream, has traveled to the far side, it is discharged by the second screw conveyor.

Multi-Louvre Dryer at an Illinois coal company profitably reduces moisture of reclaimed sludge, most of which is minus 28-mesh.